Regency®

COMMUNICATIONS, INC.

SERVICE MANUAL

VHF FM TRANSCEIVER

MODEL XLH-257

1227 S. PATRICK DRIVE
SATELLITE BEACH, FLA.

0300-4201-300

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SECTION 1 - GENERAL INFORMATION

1-1 DESCRIPTION

The XLH257 is one of Regency's XL2000 Series transceivers. The XLH257 is an eight-channel, fully synthesized, VHF FM transceiver. It is designed for operation in the 148 to 162 MHz communications band.

The eight channels are programmed into a Programmable Read Only Memory (PROM). Inside the PROM are transmitter, receiver, and CTCSS tone frequency codes. The PROM also contains control bits for transceiver control.

The XLH257 has six modes of operation. These are Simplex with or without CTCSS, full ½ Duplex with or without CTCSS, or Simplex mix with limited ½ Duplex with or without CTCSS. These restrictions are discussed in greater detail later.

The receiver section is a double-conversion receiver with a first IF frequency of 10.695 MHz and a second IF frequency of 455 KHz. Crystal and ceramic IF filters are used for excellent selectivity. The maximum frequency spread of receive frequencies is 1.5 MHz (±.75 MHz from a center-tuned frequency).

The transmitter is all solid-state with an output power of 25 watts. The transmitter modulation is direct FM which is factory set at ±5 KHz deviation. The transmitter is type accepted under Parts 21, 81, and 90 of the FCC Rules and Regulations.

1-2 EQUIPMENT SUPPLIED

a. 1 - Transceiver
b. 1 - Microphone w/connector
c. 1 - Mobile mounting bracket w/hardware
d. 1 - DC power cord and fuse

1-3 SPECIFICATIONS

Transceiver specification Drawing No. 304-295
(see following page)

No	GENERAL	NOMINAL	GUAR
1	CHANNELS	8	4,6 OR 8
2	FREQ RANGE		148-162 MHZ
3	OPERATING TEMP		-30° TO +60° C
4	OPERATING DUTY CYCLE		25% MAX
5	SIZE (W x H x D)	5 3/16 x 2 3/8 x 9 1/4 IN	14.6 x 6 x 23.5 CM
6	WEIGHT	4 3/4 LB	2.16 KG
7	POWER	———	———
	CURRENT DRAIN	@ 13.8 VDC	
8	RCVR SQUELCH	325 MA	425 MA MAX
9	RCVR MAX. AUDIO	850 MA	950 MA MAX
10	TRANSMIT	6 A	6.25 A MAX
11	ANTENNA	50Ω	
12	CHANNEL SPACING	25 OR 30 KHZ	

No	RECEIVER	NOMINAL	GUAR
	SENSITIVITY		
13	20 DB Q		.5 μV MAX
14	12 DB SINAD		.35 μV MAX
	AUDIO SQ SENSITIVITY		
15	THRESHOLD	.11 μV	.2 μV MAX
16	TIGHT	.43 μV	.7 μV
17	CTCSS		
18	ADJ. CH SEL 20 DB		
19	ADJ. CH. DESEN 12 DB		-70 dB
20	OPERATING BANDWIDTH		± 750 KHZ
21	SPURIOUS & IMAGE		-70 dB
22	IM 20 DB Q		-70 dB
23	IM 12 DB SINAD		-70 dB
24	MAB		± 7.5 KHZ
25	FREQ STAB TEMP.		±.0005%
26	FREQ STAB VOLTAGE		
27	AUDIO RESPONSE		EIA RS-204A
28	AUDIO OUT PWR (MAX)	5W WITH 5% DIST	5W WITH 10% DIST

REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED
	A	R-488	2-2-81	

NO	RECEIVER	NOMINAL	GUAR
29	AUDIO OUT PWR		1W WITH 2% DIST MAX
30	SQ BLOCKING		EIA RS-204A
31	RCVR ATTACK TIME		EIA RS-204A
32	RCVR SQ CLOSING		EIA RS-204A
33	HUM & NOISE RATIO	-70 DB SQ. -45 DB UNSQ.	-60 DB SQ. -40 DB UNSQ.
34	UNDESIRED CONDUCTED (AC)		———
35	UNDESIRED CONDUCTED (RF)		
36	UNDESIRED RADIATED		FCC PART 15 SUBPART C
37	HIGH HUMIDITY		———
38	VIBRATION STAB		———
39	SHOCK STAB		———

	TRANSMITTER	NOMINAL	GUAR
40	PWR OUTPUT @ 13.6 VDC	27W	25W MIN
41	DC PWR IN TO FINAL	40W	
42	OUT FREQ STAB (TEMP)		±.0005%, MAX

NO	TRANSMITTER	NOMINAL	GUAR
43	OUT FREQ STAB (VOLT)		±.0001% MAX
44	SPUR & HARM CONDUCTED		-58 dB MIN
45	SPUR & HARM RADIATED		FCC PARTS 21, 81, 90
46	OPERATING BANDWIDTH		± 1.5 MHZ
47	EMISSION DESIGNATOR		16 F3
48	MODULATION DEV RANGE		0 TO ± 7 KHZ
49	AUDIO FREQ DISTORTION		3% MAX
50	FM HUM & NOISE		40 dB MIN
51	AM HUM & NOISE		———
52	AUDIO FREQ RESPONSE		EIA RS-152 B
53	TRANS CARRIER ATTACK		EIA RS-152 B
54	SIDEBAND SPECTRUM		FCC PARTS 21, 81, 90
55	HIGH HUMIDITY		———
56	VIBRATION STABILITY		———
57	SHOCK STABILITY		———

	XLH 257 R
NEXT ASSY	USED ON
XLH 257	
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES.
TOLERANCES ARE:
FRACT ± DEC .XX ± .XXX ± ANGLE ±

MATERIAL ———

FINISH ———

DO NOT SCALE DWG.

APPROVALS	DATE
DRAWN RDR	2-2-81
CHECKED CM+C	2-2-81
OPTG. SUPV	
ENGR HDT	2-2-81

Regency COMMUNICATIONS INC.
SATELLITE BEACH, FLORIDA 32937

SPECIFICATIONS
XLH-257

SIZE B | PART NUMBER 304-295 | REV A

SCALE ——— | SHEET 1 OF 1

1-4 OPTIONS

a. MA- 35 - Quick Mount Thumb Bolts
b. MA- 48 - 5-Watt Horn Speaker
c. MA- 79 - Telephone Hand Set
d. MA- 84 - DC Power Cord
e. MA- 87 - DC Power Cord w/Cigarette Lighter Adapter
f. MA-194 - 2805 Decoder
g. MA- 93 - Split Bar Desk Microphone
h. MA-108 - External Speaker
i. MA-126 - Telephone Hand Set w/Hookswitch
j. MA-310 - Hand-Held Microphone
k. MA-311 - Mounting Bracket
l. MA-322 - DC Power Cord for P1412
m. P1412 - 12A DC Power Supply

1-5 EQUIPMENT NOT SUPPLIED

a. Antenna
b. Coaxial Feed Line
c. Connectors for Radio or Antenna
d. Power Supply (Battery)

1-6 INSTALLATION

The XLH257 transceiver is designed for use on 12V negative ground vehicles. Connect the red (+) lead of the power cord to the positive battery terminal and the black (-) leads of the power cord to the negative terminal.

To enable the use of the microphone hang-up button, the microphone hanger clip must be grounded. If mounted on a non-grounded surface, add a ground wire to the clip.

THE ANTENNA USED SHOULD BE PROPERLY ADJUSTED FOR THE 50 OHM OUTPUT IMPEDANCE OF THE TRANSCEIVER. FAILURE TO DO SO WILL RESULT IN POORER TRANSMITTER PERFORMANCE.

Connections for an external speaker is provided (J2) for connecting the MA-108 or the MA-48.

1-7 OPERATION

The On-Off switch is part of the volume control. Turning the control clockwise will turn the radio on. The display will turn on to the first channel position. Any time the radio is turned off the radio will revert to the first channel position when turned on.

Maximum audio is obtained by turning the volume control fully clockwise. The volume control should be adjusted to a comfortable listening level.

Turning the squelch control counter-clockwise will cause the radio to be squelched. The point at which the radio just squelches is called threshold squelch. When a signal is present the squelch will open. If the squelch control is fully counter-clockwise, more signal is required to open the squelch; the receiver will not be "locked out" (i.e. prevented from receiving a signal).

The microphone supplied with the radio plugs into the side of the radio. The connector is locked into place with the locking ring; rotate the ring ¼ turn to lock the connector.

Channels are selected using the channel switch. This switch steps the radio through 8 channel positions.

An option switch is also provided for customizing the radio. Some examples may be to switch an external speaker on or off or to enable or disable a decoder. Three pins are provided on the back of the control board for switch connections.

To transmit a message, press the push-to-talk button on the side of the microphone. The red transmit light will come on to indicate the transmitter is activated.

The MSG (message) light indicates when a message has come in for the user. The light is activated by a decoder (e.g. 2805 or CTCSS decoders).

SECTION 2 - CIRCUIT DESCRIPTIONS

2-1 RECEIVER DESCRIPTION

The receiver is essentially the same receiver as that used in the XLH252 model transceiver.

Received RF enters at the antenna connector and is routed through the antenna switch (L309, C315 and C316). Circuits involving L310, 311, 312, and 313 involve the transmitter and will be discussed later. The RF then proceeds to the RF amplifier Q401 through the tuned circuits of L401 and L402.

The output of the RF amplifier's collector tank (L403, C409) is fed to the mixer, Q403 via input tuned circuit, L404 and C404, where it is mixed with the L.O. (at 10.695 MHz below the carrier) to produce the first IF.

The L.O. is produced by taking the output of the VCO (voltage controlled oscillator) board and doubling the frequency at the Q402 stage. The L.O. output is tuned using L405 and L406 tank circuits.

From the collector tank of the mixer (Q403) the IF signal is fed through the crystal filters XF401A and XF401B. From the crystal filters the signal is inputted to IC401 at Pin 18. The second L.O. (10.24 MHz reference) is fed into Pin 1 of the same IC. The 455 KHz second L.O. signal from Pin 3 of IC401 goes through the ceramic filter, CF401, and back into IC401 at Pin 5. The recovered audio exits IC401 at Pin 10.

The audio goes through R416 to a low-pass filter, R422 and C442. It is then coupled through a 4-pole high-pass filter whose output is at Pin 7 of IC402. The audio is coupled from the filter to the base of Q404, the squelch switch transistor. The base gets its bias from R414, R431 and R432. The SQ. OUT (Pin 16 of IC401) controls this bias line through R454. The squelch circuit will be described later. From the squelch switch transistor (an emitter follower) the audio goes to the volume control (Pin 5 P501) and on to the audio power amplifier IC403.

The audio from the discriminator (Pin 10 of IC401) also goes through a low-pass filter, IC402A and IC402D. This is the audio source for the CTCSS decoder. The audio goes to Pin 1 of IC508 where it is limited to a +5V to 0V signal, then on to Pin 38 of the microprocessor. The microprocessor takes this signal and determines if the frequency agrees with the programmed tone frequency. If the tone agrees then the SQ. bias is turned on to Q404 from Pin 33 of the microprocessor.

Finally, the discriminated audio goes to the squelch control, R134, on the Control Board. The audio to the squelch pot can be seen at Pin 12 of P501 and returning audio at Pin 11 of P501.

From the squelch control the audio is high-passed through C431, C439 and the amplifier in IC401. The high-passed audio out of Pin 13 of IC401 then is rectified via low-pass filter (R418, R419, C435) and CR401. The rectified voltage goes to IC401 Pin 14 (squelch input) which controls the squelch switch; the output of the squelch control, Pin 16, is connected to R454. When the radio is squelched Pin 16 is low (0V) thus removing the bias to Q404.

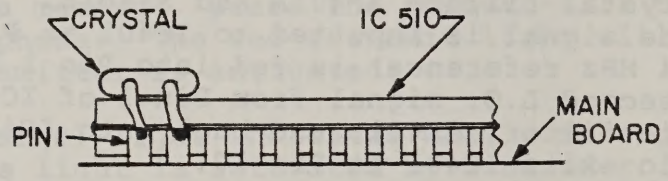
The receiver has some self-quieting frequencies. These frequencies are noted below. If any of the eight channels are within the receiver bandwidth (±15 KHz) of the self-quieting frequencies, the following changes must be incorporated on the Main Board:

Remove IC503, 74LS73

Remove purple wire from Pin 2 of IC510 to Pin 0 of IC503

Remove R548, 1.2K ohm resistor

Install a 3.4133 MHz crystal (P/N 2342-3303-301) from Pin 1 of IC510 to Pin 2 of the same IC (see figure below)



SELF QUIETING RECEIVER SPUR FREQUENCIES IN ORDER OF PROMINENCE FOR THE XLH252 (±.015 MHz)

153.600 MHz	151.475 MHz
154.965	159.975
160.425	154.282
154.510	159.960
153.145	151.100
160.578	153.125
153.752	154.205
154.385	155.340
161.340	

2-2 TRANSMITTER DESCRIPTION

The RF drive for the transmitter comes from the VCO Board (1mw). The frequency is one-half of the carrier frequency. The doubler stage, Q508, brings the VCO output up to the carrier frequency and has a gain of 10dB. The next stages, Q509 and Q510, raise the power level up to 400mw to be fed to the P.A. Deck. The P.A. Deck then amplifies the RF up to 25W. Each stage gives 10dB of gain.

The antenna switch protects the receiver front end from damage due to the high RF level. When the transmitter is keyed 13V is applied to R303. This allows current to flow through CR301 and CR302 and allows L309 and C315 (a parallel tuned circuit) to block the transmitting RF.

L318, C317 and L313, C319 are traps for the Second Harmonic and L311, L312 and C318 form a low-pass filter.

The XLH257 uses a direct FM modulator. The speech from the microphone enters at U1 and is limited by IC501A and IC501B. The limited audio can be seen at Pin 7, M1, of IC501. From point M1 the audio is fed through the post limiter filter IC501C, IC501D. IC501D, Pin 14 drives the modulation deviation control, R515. The audio from the deviation control is then fed to the VCO Board to CR201. Note that CR201 is only active when the transceiver is transmitting. This is because Q201 is turned off when transmitting and on when receiving.

The modulation symetry is controlled by R512, which controls the bias point of the modulator's four operational amplifiers.

The subaudible tone for the CTCSS modulation is derived from the microprocessor at Pin 32 of IC510. The tone is filtered through IC509A and IC509B, a low-pass filter. From Pin 7 of IC509 the subaudible tone goes to the tone deviation control, R517. From the arm of the control the tone is then fed to the input of the first post limiter filter amp (Pin 9 of IC501C). It can be seen that the modulation deviation control not only controls the modulation deviation but also the tone deviation of the CTCSS tone. It is because of this that before setting the CTCSS tone deviation the modulation deviation (from mic input) be set by R515. Then adjust R517 for the desired CTCSS tone deviation.

A transmitter shut-down circuit is used to protect the P.A. from a high VSWR (such as an open antenna line). A rectified voltage directly proportional to the amount of reflected power is at Pin 4 of IC507. With the output terminated into 50 ohms and with R580 properly adjusted, the voltage at Pin 4 will be about 3V. When the load is disconnected from the ant. connector (open load) the voltage will increase about 200mV, and the voltage at Pin 10 of IC507, will be reduced.

WARNING: With R580 adjusted to maximum clockwise position the VSWR protection circuit is disabled. For VSWR protection R580 must be set according to the procedure described in the transmitter alignment procedure.

2-3 SYNTHESIZER

The frequency synthesizer is comprised of the VCO Board, the microprocessor and the synthesizer chip (IC511) on the Main Board. The microprocessor, IC510, receives data from the front panel, via P501 and P502 cables, and converts this data to proper codes for the synthesizer chip, IC511. The microprocessor also translates data from jumpers on the Main Board, JU's N through Y. The translated data from IC510 goes to IC511 via the SYNDATA line (Pin 32 of IC510). The data is received by IC511 at Pin 10 where it is loaded using the SYNCLOCK line (Pin 7 of IC510) as a clock.

IC511, the synthesizer chip, contains the reference oscillator, the reference divider, the VCO programmable divider, the phase detector, and the out-of-lock detector. The reference oscillator runs at 10.240 MHz and is divided internally for the reference signal to the phase detector. Y501 maintains the frequency of the oscillator over the full temperature range. The 10.240 reference signal can be measured at Pin 14 of IC511. The reference oscillator's frequency is controlled by one of two variable capacitors (for adjusting receiver and transmitter frequencies), C518 and C520. If the receive frequency is an even multiple of 5 KHz (i.e. 152.480, 152.490, etc.) then C518 adjusts the receiver frequency and C520 adjusts the transmitter frequency. If the receive frequency is an odd multiple of 5 KHz (i.e. 152,475, 152.485, etc.) then C520 adjusts the receive frequency and C518 adjusts the transmitter frequency. The capacitors C518 and C520 are switched by the synthesizer IC, IC511, via Q501 and C502, respectively.

By dividing the reference oscillator's output by 4 the microprocessor clock is produced (3.413 MHz at Pin 9 of IC503).

The variable frequency output of the VCO Board (Pin 7 of IC201) is fed to Pin 8 of IC511. This is the input to the programmable divider. The programmable divider (interval to IC511) divides the signal from the VCO in accordance with the data transferred from the microprocessor, IC510 (as discussed in first paragraph). The output of the programmable divider goes to the phase detector which outputs the phase error signal out on Pin 4. This Ø DET OUT signal steers the VCO to make the phase error smaller. From Pin 4 of IC511, the Ø DET OUT signal is filtered by R540, C514 and the low-pass filter/amplifier IC502. The output of the low-pass filter, Pin 6 of IC502, (also M5 metering point) is the steering voltage for the VCO. The lower the M5 voltage the lower the VCO frequency; the higher the M5 voltage the higher the VCO frequency. When the synthesizer is "locked" this voltage is controllable by adjusting L201. The synthesizer will remain "in-lock" as long as this voltage remains between 1V and 7V.

The M5 test point is factory set for 5V for Simplex radios and is set for 2.5 to 3V for ½ Duplex radios with over a 5 MHz frequency split, adjusted on lower frequency. The M5 voltage increases 1 volt for every 2.5 MHz increase.

The VCO Board contains the voltage-controlled oscillator, the modulator, a buffer amplifier and a dual-mode counter. The oscillator, Q202, runs at 75 MHz where the frequency determining components are C208, C210, L201, CR202 in parallel with C218 and CR201 (only when transmitting). The output of the oscillator is coupled to the buffer, Q203 through C209. An amplified output of the buffer goes to the input of the counter. The counter divides the VCO frequency down to about 5 MHz. The output Pin 7 then goes out to the synthesizer chip IC511, Pin 8. From the emitter of the buffer comes the TX drive coax, for driving the exciter and the RX drive coax, for the receiver L.O.

To protect the radio from spraying the countryside with unwanted RF signals, there is a transmitter disable circuit that, when the synthesizer is "out-of-lock", will prevent the transmitter from being keyed. From Pin 7 of IC511, the "out-of-lock" detector, a voltage level of 4.5V will be presented if the systhesizer is locked on frequency. This enables IC504D's output to go high (4V) when the $\overline{\text{TXDLY}}$ line goes low. But if the synthesizer is not locked on frequency, Pin 7 of IC511 will be low (0V) and thus will not allow Pin 13 of IC504D to go high, thereby "locking out" the transmitter.

The frequency stability with ambient temperature change is accomplished by the crystal characteristics of Y501 and with some help from a crystal heater circuit for temperatures below freezing. The crystal heater consists of a 100 ohm 2 watt resistor, Q511, R566, R568, and RT501. As the ambient temperature drops, the thermistor's (RT501) resistance increases allowing a higher base current through Q511 and, therefore, an increase in current through the heater resistor R567. The temperature that the heater starts to turn on is 10°C (50°F).

2-4 CONTROL BOARD

The Control Board does exactly as the name implies, it controls the radio. Besides being able to change the volume and squelch levels, it stores the information that is required to make the transceiver operational.

The Control Board has 14 lines which interface with the microprocessor, IC510, on the Main Board. These 14 lines output the frequency codes for the receiver and/or the transmitter, plus the CTCSS tone codes. All the codes sent over the 14 lines are held inside the Programmable Read Only Memory (PROM), IC102. Once the PROM has been programmed, its contents cannot be altered.

The majority of the circuitry on the front panel deals with getting the information out of the PROM and on the 14 lines going to the microprocessor. For the following descriptions refer to the Control Board Block Diagram and Schematic.

The center of activity is the PROM, it has a 32 x 8 bit arrangement. Channel selection is accomplished by stepping through eight positions on the line counter. The name of line counter is given because it addresses one of eight lines on one of four pages of memory. Each page of the memory is addressed by the page counter (pages 0 through 3). Data on pages 1, 2, and 3 is latched into 24 latches via an 8-bit data bus. Page Ø data is not latched because the page counter stops at page Ø after all the data (on pages 1, 2, and 3) have been latched. Page Ø contains the display code.

When the user advances to the next channel, the step switch grounds R101 putting a low (.8V) on Pin 9 of IC110. The output, Pin 8, goes high, momentarily pulsing Pin 5 of IC110. The output, Pin 6, will be a negative going pulse. This negative going pulse does two things. First it advances the line counter to look at the next line position in the memory (i.e. next channel position). Secondly, it starts the page oscillator running.

Looking at the page oscillator, the page oscillator is inhibited when Q101 is turned on (Pin 2 of IC110 is therefore low). When the pulse from Pin 6 of IC110 turns off Q101, C104 charges up through R113 until the input (Pin 3 of IC110) recognizes the voltage as a high. When this happens the output (Pin 4 of IC110) goes low and starts to discharge C104 until the input recognizes the low; when the output goes high completing the cycle. The oscillator output to the Control Board is at Pin 2 of IC110.

The page oscillator's output is divided by two by one section of IC101. This creates a two-bit binary code which makes up the page address. The wave forms shown on the schematic start at t_o. The time t_o is the time at which the channel step switch is pressed.

Looking at the wave forms of the lines connecting to Pins 13 and 14 of IC102 (page address A_3 and A_4, respectively) noting that Pin 13 is the Least Significant Bit (LSB). A_3 goes high 4ms after the channel step swich is pressed and A_4 remains low. This is page one and at this point the data out of IC102 (Pins 1-7, and 9) is the data from the line (channel position) as addressed by IC101, the line counter. As the oscillator continues to run the A_3 line goes low and the A_4 line goes high. The same line is still addressed but now it is that line on page two. Similarly, the data for the same line gets outputted when the A_3 line toggles once more, addressing page three. Note that during this entire paging operation that the A_3 and A_4 lines also connect to the base of Q102 via R415 and R414, respectively. This keeps Q102 turned on to allow the page oscillator to continue running until all the pages have been addressed and consequently all the data (corresponding to the line address) to be sent out and latched. When page zero is reached, A_3 and A_4 equal to a low, then Q102 releases the base of Q101 and Q101 turns on stopping the page oscillator.

The page oscillator always stops on page 0 because the data on page 0 is the display code. By holding IC102 at page 0 the display code (at the line on the page designated by IC101) drives the display which is directly connected to the outputs of IC102.

As was mentioned previously, the data from pages 1, 2, and 3 are latched from the data lines of IC102. In order to latch this data clock pulses must be generated at the proper time. The clock generation is done by the page mux (multiplex) control circuit. This circuit consists of Q105, Q107, one of the inverters of IC110, and IC103. Q107 is turned on by a positive transition from the page oscillator (A_3 line). This causes a negative spike to occur at the collector of Q107. Negative transitions on the A_3 line cause negative pulses at the collector of Q107 from R116 and C107. From these collector pulses, a low-going pulse will occur at the collector of Q106 every time a positive-going or negative transition appears on the A_3 address line. The output from Q106 drives the INHIBIT input to IC103. When the INHIBIT input is high the outputs (Q1, Q2, Q3) are all disabled. When a transition occurs on the A_3 line the current page being addressed on IC102 is the same address on IC103. The transition causes the short positive pulse to go out on the output corresponding to the address lines, lines A and B (Pins 11 and 10, respectively). The pulses at Pins 14, 15 and 12 are the clocks for page 1, page 2, and page 3 latches, respectively. That is, on the negative going edge of the pulse at Pin 14 of IC103 (Q_1 line) the data out of IC102 is page 1 data and this data is latched into IC105 and IC107. At Pin 15 of IC103 (Q_2 line) the data from IC102 is page 2 data and is latched into IC104 and IC108 at the negative edge of the clock pulse. Similarly, the data for page 3 is latched into IC106 using the clock signal from the Q_3 line (Pin 12 of IC103).

To recap, when the channel step switch is pushed down, the line counter advances to the next line position, the page counter starts and the latches are clocked to allow the data out of IC102 to be stored for processing by the microprocessor on the Main Board.

The data in the latches are as follows:

IC106 - Holds the frequency codes for the low frequency. These are the frequency codes B through I.

IC105 - Holds the B and C bits for the ½ duplex frequency.

IC107 - Holds the $\overline{A}$ (high order freq. bit) frequency code, the $\overline{A}$ freq bit for the ½ duplex frequency, and the J through M frequency codes for the low frequency.

IC108 - Holds the tone codes and the tone control bit. These are the AA through EE codes and the # bit.

IC104 - This latch holds two transceiver bits. They are the transmitter enable bit and the ½ duplex enable bit labeled Tx EN and ΔF, respectively.

The control circuit in the Block Diagram involves Q111, Q112, Q109, Q110, and one of the inverters of IC110. The transmitter is controlled by Q112 and the data that is latched into section 1 of IC104. A High at Pin 12 of IC104 will disable the transmitter. Otherwise the $\overline{PTT}$ signal at Pin 6 of J101 will be able to turn on Q110 to produce a delayed transmit signal (delayed 10ms), $\overline{TXDLY}$. When in the full ½ duplex mode the $\overline{F_H}$ line is low. When the transmit frequency is to change to the higher frequency (e.g. RCC Radio) the $\overline{F_H}$ line is pulled low by Q109. The ΔF line can be inhibited from going high when Pin 2 of IC104 is high. This is done for simplex operation.

The $\overline{F_H}$ line can also be pulled low by the channel step switch. This is to alert the microprocessor that (while in the receive mode) the user is changing channels.

NOTE: The microprocessor will not recognize a change in channels if the channel step switch is pressed while in the transmit mode.

The ΔF line's function varies from operating mode to operating mode. The transceiver has three ways which Rx and Tx frequencies can be selected; these are Simplex, Simplex with limited ½ Duplex, and full ½ Duplex.

In the Simplex mode all the jumpers in the radio are uncut and the ΔF line remains low in both receive and transmit conditions.

In the Simplex with limited ½ Duplex mode the Y jumper is cut along with the appropriate N through X jumper. The ΔF line in this mode is high if the transmit frequency is the same as the receive frequency. The ΔF line is low if the transmit frequency is offset from the receive frequency. Note that this is limited ½ Duplex since the "split" is only determined by the N through W jumpers.

In the full ½ Duplex mode all the jumpers in the radio are uncut. In this mode the ΔF line is high when the push-to-talk button is pressed. This is to allow the data at the output of IC109 to change by selecting the B lines (Pins 3, 6, and 10 of IC109) and therefore change the transmitter frequency (the N through W jumpers add to the frequency change) at Pin 1. In this mode the transmit frequency is always higher than the receive frequency. The ΔF line is low when receiving.

The power-up reset circuit is made up of Q103, Q104, and Q105. When the power is first turned on (by on-off volume control) Q103 is biased on through C105 until it becomes fully charged. This in turn causes Q104 to be on momentarily and resets IC101. Q104 also causes Q105 to turn on and this allows the page oscillator to run and latch the data out of IC102.

The front panel has some option pins located on the non-component side (solder side) of the P.C. Board. These pins allow connections of wires for optional variations, such as adding a 2805 decoder.

The option switch is connected via three pins located towards the center of the Control Board. The top pin is SØ, the center pin is S1 and the bottom pin is S2. The last pin, which is located by the chassis wiall near the VCO Board, is used if the MSG light is to be lit by another decoder other than the internal CTCSS decoder. If another decoder is to light the MSG LED then JU106 must be removed. A positive voltage must be maintained on this pin (D1 pin) to hold the MSG light on.

Lastly, the number of channels selected by the front panel can be selected to be 4, 6 or 8 channel. The radio is normally set up as an 8-channel radio (only JU103 installed). By changing jumpers JU101 through JU103, around the line counter can reset for 4 or 6 channels. Follow the programming table on the Schematic.

2-5 DECODERS

The XLH257 comes equipped with a CTCSS decoder which is included in the programming of the microprocessor, IC510. When the CTCSS decoder is active the tone codes are fed to IC510 from the latches on the Control Board along with the CTCSS decoder enable bit (Ø line). R587 must be installed in order to connect the microphone hang-up button to Pin 3 of IC510. Lifting the ground from this line puts the radio into the monitor mode.

The choice of CTCSS tone frequencies are given in the list below. These are the only encoding and decoding tones available at this time.

CTCSS TONE FREQUENCIES

67.00	107.2	141.3	186.2
71.90	110.9	146.2	192.8
77.00	114.8	151.4	203.5
82.50	118.8	156.7	210.7
88.50	123.0	162.2	218.1
94.80	127.3	167.9	225.7
100.0	131.8	173.8	233.6
103.5	136.5	179.9	241.8

If an alternate decoder is used the CTCSS decoder must be disabled. To disable the CTCSS decoder R587 must be removed, R517 must be adjusted fully clockwise, and the PROM must be programmed for no CTCSS tones. The alternate decoder can then be installed.

The control points for an auxiliary decoder are:

Squelch control - Pin 14 of IC401; when pulled up through diode will squelch the radio

Audio source - Pin 10 of IC401 or at the top of the squelch potentiometer

Monitor switch - Using the microphone hang-up button and/or the option switch on the Control Board

2-6 POWER SUPPLY

The power supplied to the Receiver, Transmitter and Control Boards originate from three sources, the unregulated 13V line (PØ, P1), a regulated 8V source and a regulated 5V source. The 5V regulated supply (from IC505) feeds all the logic circuits on the Control Board and the Main Board along with the counter on the VCO Board.

Circuits that receive 5V as their supply are:

1. All the IC's on the Control Board
2. IC201 on the VCO Board
3. Bias for Q404, squelch switch transistor
4. IC503, IC504, IC508, IC510, and IC511 on the Main Board

The 8V regulated supply is electrically switched to supply 8V switched to the transmitter and receiver circuits. An 8V line (not electrically switched) also feeds to some circuits that do not require Tx or Rx switching. A summary of circuits receiving 8V are as follows:

+8V Rx switched (collector of Q504):

1. The collector supply of Q401, RCVR RF AMP
2. The collector supply of Q402, RCVR L.O. Doubler
3. The supply to IC402, Pin4, RCVR IF sub-system chip

+8V Tx switched (collector of Q503):

1. Collector and bias supply for Q508, Tx doubler
2. Collector and bias supply for Q509. Tx amplifier
3. Muting source to audio amplifier, IC403, and receiver squelch input of IC401

+8V (from IC506):

1. IC402, Pin 4, RCVR audio filters
2. Collector of Q404, Squelch switch
3. Supply to Q403, RCVR MIXER
4. IC501, Pin 4, Tx sppech amplifier
5. IC502, Pin 7, VCO loop filter
6. VCO supply, brown wire
7. bias for modulation varactor, CR201
8. IC509, Pin 8, CTCSS tone filter

The 8V switching circuit uses the logic level from the outputs of IC504 Pins 13 and 1 to control the switching transistors. When in the receive mode Pin 13 is a low (0V) and Pin 1 is a high (greater than 2V). This allows Q506 to be on and Q507 to be off. When in the transmitting mode Pin 13 is high and Pin 1 is low (provided the VCO is "in-lock"). This turns Q506 off and Q507 on.

The 13V line is broken up into three supplies; the 13V unswitched, the 13V switched and the 13V Tx switched. The 13V unswitched supply connects to the on-off switch on the Control Board to be turned into the 13V switched supply. Also the 13V unswitched supply feeds the power to the transistors on the P.A. Board. The 13V switched line feeds power to the RCVR audio amplifier, IC403, the crystal heater element, R567, and the VSWR control, IC507. The 13V Tx switched supply only feeds voltage to connect the antenna (via the antenna switch) to the P.A.'s output.

SECTION 3 - PROGRAMMING

3-1 GENERAL

The XLH257 radio frequencies are programmed using a Programmable Read Only Memory (PROM). Because of hardware restrictions programming restrictions are limited to the following:

a. The XLH257 can be programmed for all CTCSS channels or none at all.

b. The radio can be programmed for all Simplex channels.

c. The radio can be programmed to mix Simplex channels with ½ Duplex channels provided that all the ½ Duplex channels have the same Rx/Tx "split" and that Rx/Tx "split" does not exceed 5.26 MHz (these are the same "splits" as for the XLH252).

d. The radio can be programmed for all ½ Duplex channels with the same "split" (within the transceiver band pass) provided the transmitter frequency is higher than the receive frequency (full ½ Duplex implies up to a 14 MHz split).

e. The radio can be programmed for all ½ Duplex channels, where the transmitter frequency is higher or lower than the receive frequency, provided the split is within 5.26 MHz (the same splits as for the XLH252).

3-2 PROM INSERTION

If radio programming is to be changed, replacement of the PROM will be necessary. The PROM is located on the Control Board. To replace the PROM, the front panel Control Board assembly will have to be disassembled. Refer to Figure 1 on the next page to aid in disassembly.

Front panel disassembly is as follows:

1. Remove four sheet metal screws holding the mounting bracket.
2. Remove the volume and squelch knobs.
3. Remove the five screws holding the front panel to the mounting bracket.

The PROM is located in the socket to the right of the option switch and squelch control (see Figure 2). Remove the old PROM and install the new PROM noting that Pin 1 is in the upper left. Assemble the front panel and Control Board by reversing the disassembly order.

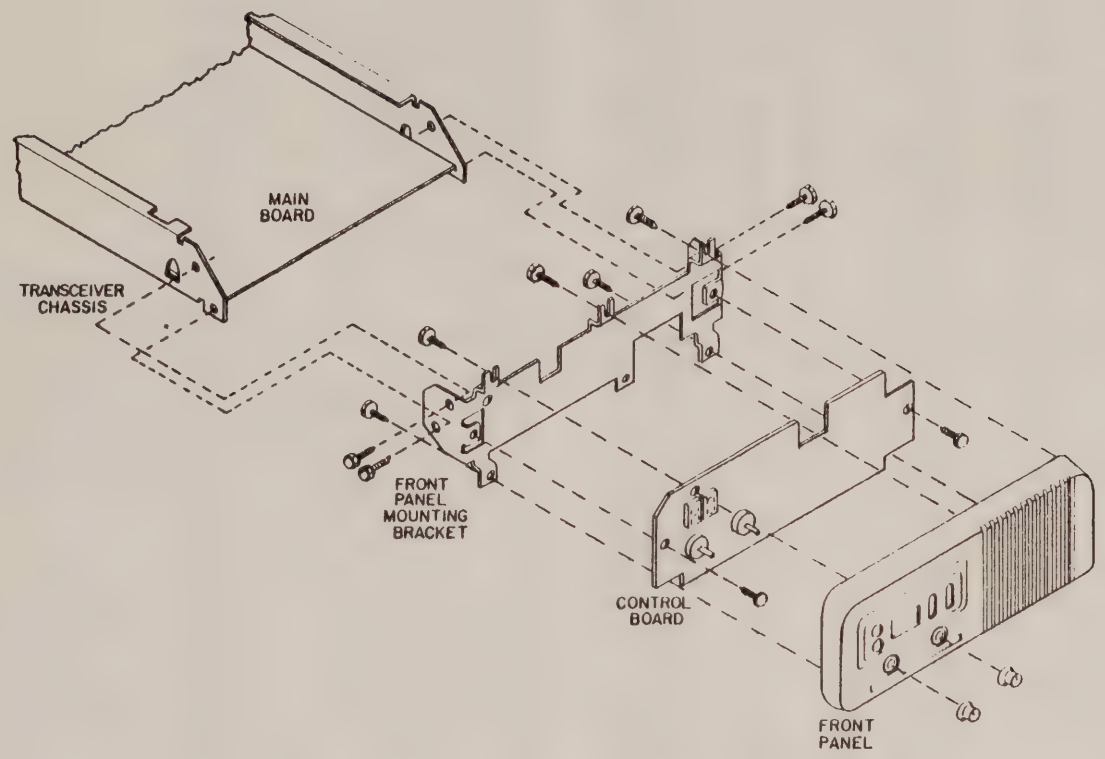
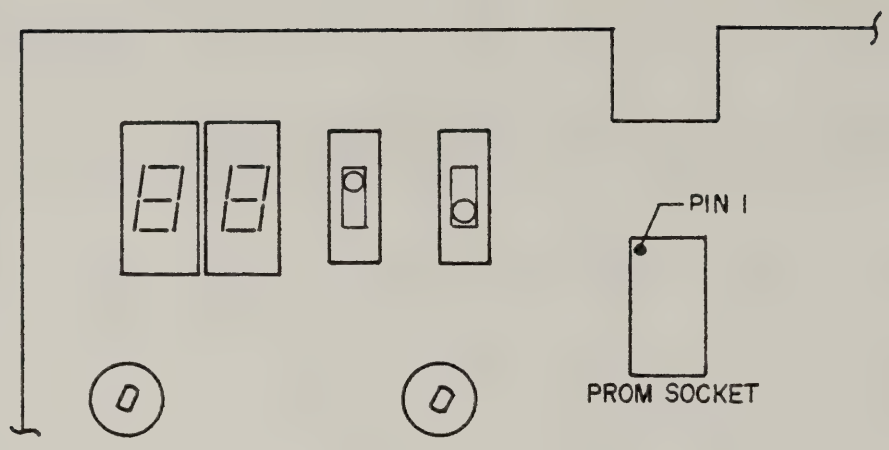


FIGURE 1

REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED
	A	RELEASE	2-81	

		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE FRACT DEC ANGLE	APPROVALS	DATE	Regency COMMUNICATIONS INC SATELLITE BEACH, FLORIDA 32937
			DRAWN SR	2-81	FRONT PANEL ASSEMBLY
		MATERIAL	CHECKED		
			QA/G SUPV		
		FINISH	ENGR MDT	2-81	SIZE C PART NUMBER 504-509 REV A
NEXT ASSY	USED ON				SCALE NONE SHEET 1 OF 1
APPLICATION		DO NOT SCALE DWG			

FIGURE 2



3-3 RADIO PROGRAMMING

This procedure is used if any radio jumpers are to be cut. The jumpers will have to be cut if the radio is not an all Simplex radio. The jumpers to be cut are listed on the programming instructions included with each PROM. The only jumpers that are to be cut are the N through W jumpers, the X jumper and the Y jumper.

The N through W jumpers are cut any time there is a ½ Duplex channel programmed into the PROM. The Y jumper is cut only if limited ½ Duplex operation is programmed into the PROM (i.e. the ½ Duplex channel frequency splits are limited to the cut-range of the N through W jumper). The X jumper is cut only if the Y jumper is cut and only if the receive frequency (on ½ Duplex channel) is higher than the transmit frequency.

After the proper jumpers have been cut, proceed to the Receiver and Transmitter Tuning Procedures (Section 5).

SECTION 4 - XLH257R RCC RADIO

4-1 GENERAL DESCRIPTION

The XLH257R is an 8-channel VHF radio with the PROM programmed for the RCC VHF frequencies of 1, 3, 5, 7, 9, 11, and 13. The user may select any combination of the RCC channels in any order to produce a 4, 6, or 8-channel RCC radio.

One Simplex channel may be substituted for one of the channels. Note, however, that some degradation of receiver or transmitter must be expected if a Simplex channel is added; this is because the Simplex frequency will be outside the bandpass.

Decoders offered for the XLH257R are a 2805 Decoder or a CTCSS Decoder (if desired). More information on decoders is given in Section 2-5.

4-2 CONVERTING AN XLH257 INTO A XLH257R

The first thing that is needed is an RCC PROM. The RCC PROM must be installed. Follow the PROM insertion instructions in Section 3-2.

The following jumpers must be cut:

N P Q R S V W

If the CTCSS Decoder is to be disabled then R587 must be removed and the wire from Pin 5 (microphone hang-up wire) must be secured in a safe place. R517 must also be adjusted to the most clockwise position.

After all programming is complete, continue on to receiver and transmitter tuning in Section 5.

4-3 FREQUENCY LISTING

Channel	Rx Freq.	Tx Freq.
1	152.030 MHz	158.490 MHz
3	152.060 MHz	158.520 MHz
5	152.090 MHz	158.550 MHz
7	152.120 MHz	158.580 MHz
9	152.150 MHz	158.610 MHz
11	152.180 MHz	158.640 MHz
13	152.210 MHz	158.670 MHz
*P	152.240 MHz	Transmitter disabled

*NOTE: This position does not have to be the P-5 channel. The user may wish to leave it blank or place a receive-only channel of another frequency. A Simplex channel may be placed there, but some receiver and/or transmitter performance degrading must be expected depending on the frequency selected.

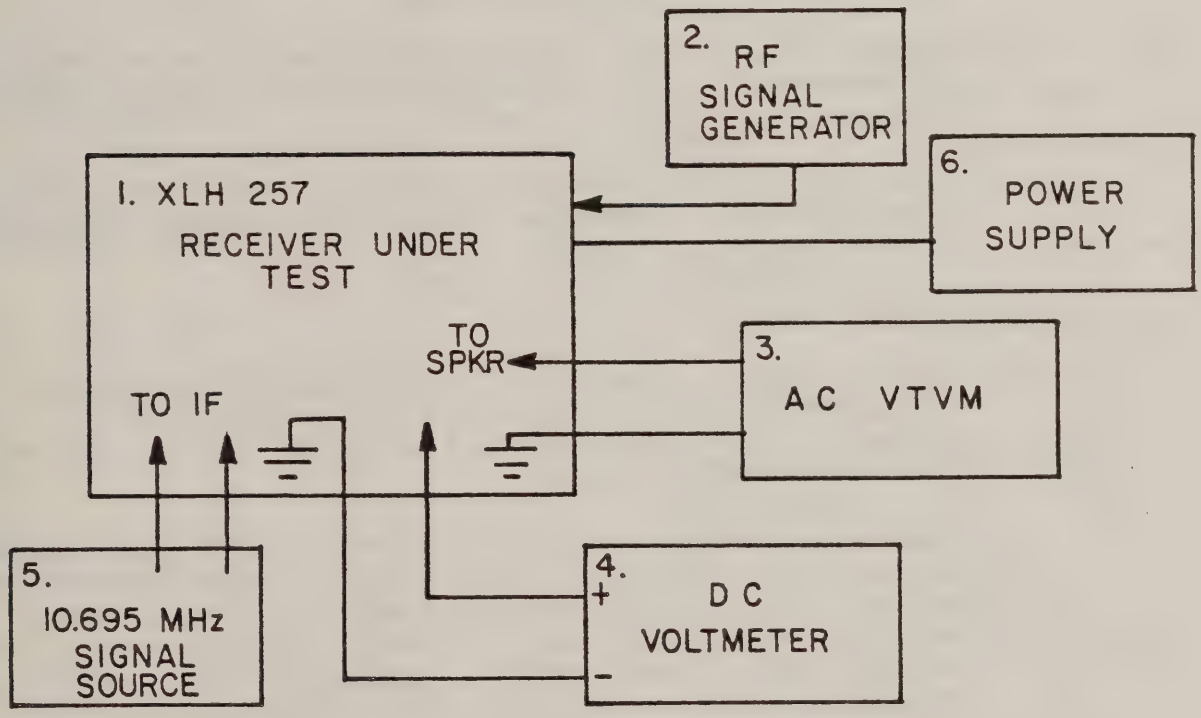
SECTION 5 - RECEIVER AND TRANSMITTER ALIGNMENT

5-1 RECEIVER ALIGNMENT

A. Equipment

1. XLH257
2. RF Signal Generator 148-162 MHz
3. AC VTVM
4. DC Voltmeter
5. 10.695 MHz Signal Source
6. Power Supply

B. Set-Up



C. Tuning Procedure

1. Connect the DC voltmeter from point M5 to ground. Adjust L201 for 3V if the radio is a ½ Duplex radio with the receive frequency more than 4 MHz below the transmit frequency. Adjust L201 for a voltage of 4.5V if the radio is Simplex or ½ Duplex with split less than 4 MHz.

2. Connect a DC voltmeter from point M2 to ground. Tune L405 for a dip on the voltmeter.

3. Connect a voltmeter between M3 and ground. Tune L406 for a peak; retune L405 and L406 for a peak on M3.

4. With the radio unsquelched, connect the AC VTVM across the speaker. Adjust the volume control to a comfortable listening level and note the VTVM reading as the reference level.

5. Connect the signal generator to the antenna terminal and adjust it, on frequency, so that 15dB of quieting is obtained.

6. Tune L401, L402, L403, and L404 for minimum noise as read on VTVM. Decrease RF signal level to maintain a 15dB quieting level.

7. Repeat Step 6.

8. Remove signal generator from RF input and couple a 10.695 MHz signal into the mixer stage, Q403. Connect a DC voltmeter to Pin 10 of IC401. Adjust L409 for a 3.2V reading.

9. Remove 10.695 MHz signal and re-connect the signal generator. With the signal generator on frequency, adjust C518 if the receive frequency is an even multiple of 5 KHz (i.e. 152.820, 152.830, etc.) or adjust C520 if the receive frequency is an odd multiple of 5 KHz so that the voltage at Pin 10 of IC401 is again 3.2V.

   NOTE: An alternate method may be used by connecting a counter (using a 1:1 probe) to M4. The appropriate capacitor, C518 or C520, is then adjusted to give a counter frequency of 10.695 MHz less than the receiver carrier frequency with an accuracy of ±100 Hz.

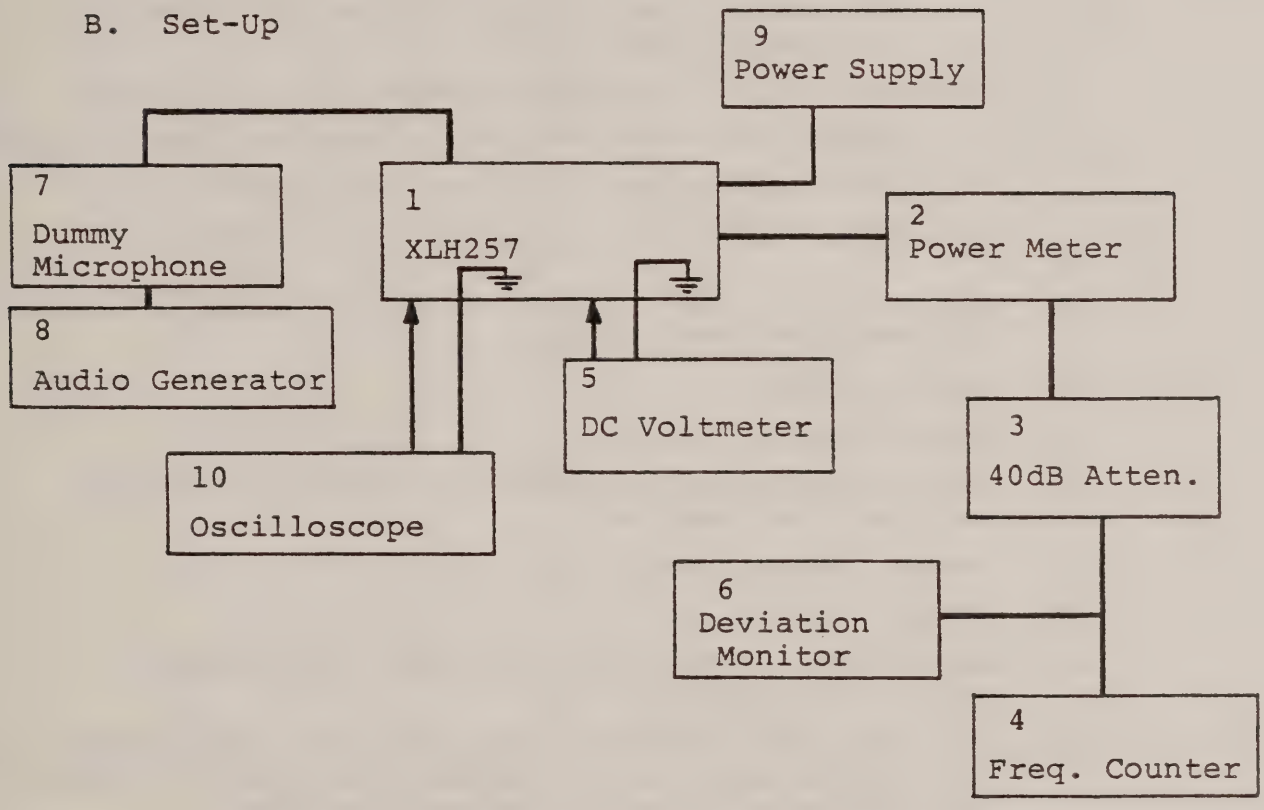
10. Adjust L407 for minimum noise as was done in Step 6.

5-2 TRANSMITTER ALIGNMENT

A. Equipment

1. XLH257
2. Power Meter
3. 40dB attenuator
4. Frequency Counter (resolution to 100 Hz)
5. DC Voltmeter
6. Deviation Monitor
7. Dummy Microphone
8. Audio Generator
9. Power Supply (6A minimum)
10. Oscilloscope

B. Set-Up



C. Procedure

1. Set up equipment as shown on preceding page. Set R580 to maximum clockwise position.
2. Set the M5 voltage by tuning L201.
   a. If the radio is a ½ Duplex radio with the transmit frequency lower than the receive frequency by not more than 4 MHz, set M5 to 4.5V while transmitting.
   b. If the radio is a ½ Duplex radio with the transmit frequency below the receive frequency by more than 4 MHz then set M5 voltage to 3V (while on the lowest transmit frequency).
   c. For Simplex radios tune for an M5 voltage of 4.5V as in Step 4-1, C1.
3. Connect the DC voltmeter between M8 and ground.
   a. Adjust L501 and L502 for a peak on the voltmeter.
   b. Adjust L503 for a dip on the voltmeter.
   c. Adjust L504 for a peak on the voltmeter.
4. Adjust C301, C307, C311, and C313 on the P.A. Board for maximum power output.
5. Repeat Step 4.
6. Repeat Steps 3 and 4.
7. Adjust R580 counter-clockwise until a reduction in power is observed.
8. Repeat Steps 3 and 4.
9. Unkey radio.
10. Adjust R517, tone deviation pot, to maximum clockwise position.
11. Set the audio generator to 1 KHz tone and adjust R512 for a symetrical clipped wave form as observed on test point M1 with the oscilloscope.
12. Using the deviation monitor, key the transmitter and adjust R515 for $\pm$4.5 KHz deviation.
13. Remove the 1 KHz tone and adjust R517, tone deviation, for $\pm$350 Hz deviation, only if CTCSS decoder is desired.
14. Set the carrier frequency using the frequency counter. Adjust the appropriate cap (C518 or C520) for the transmit frequency with an accuracy of $\pm$ 100 Hz.

    NOTE: Skip this step if both C520 and C518 were adjusted already during receiver tune-up.

    a. If the transmitter frequency is an even multiple of 5 KHz, adjust C520 for the proper transmit frequency.

b. If the transmitter frequency is an odd multiple of 5 KHz, adjust C518 for the proper transmit frequency.

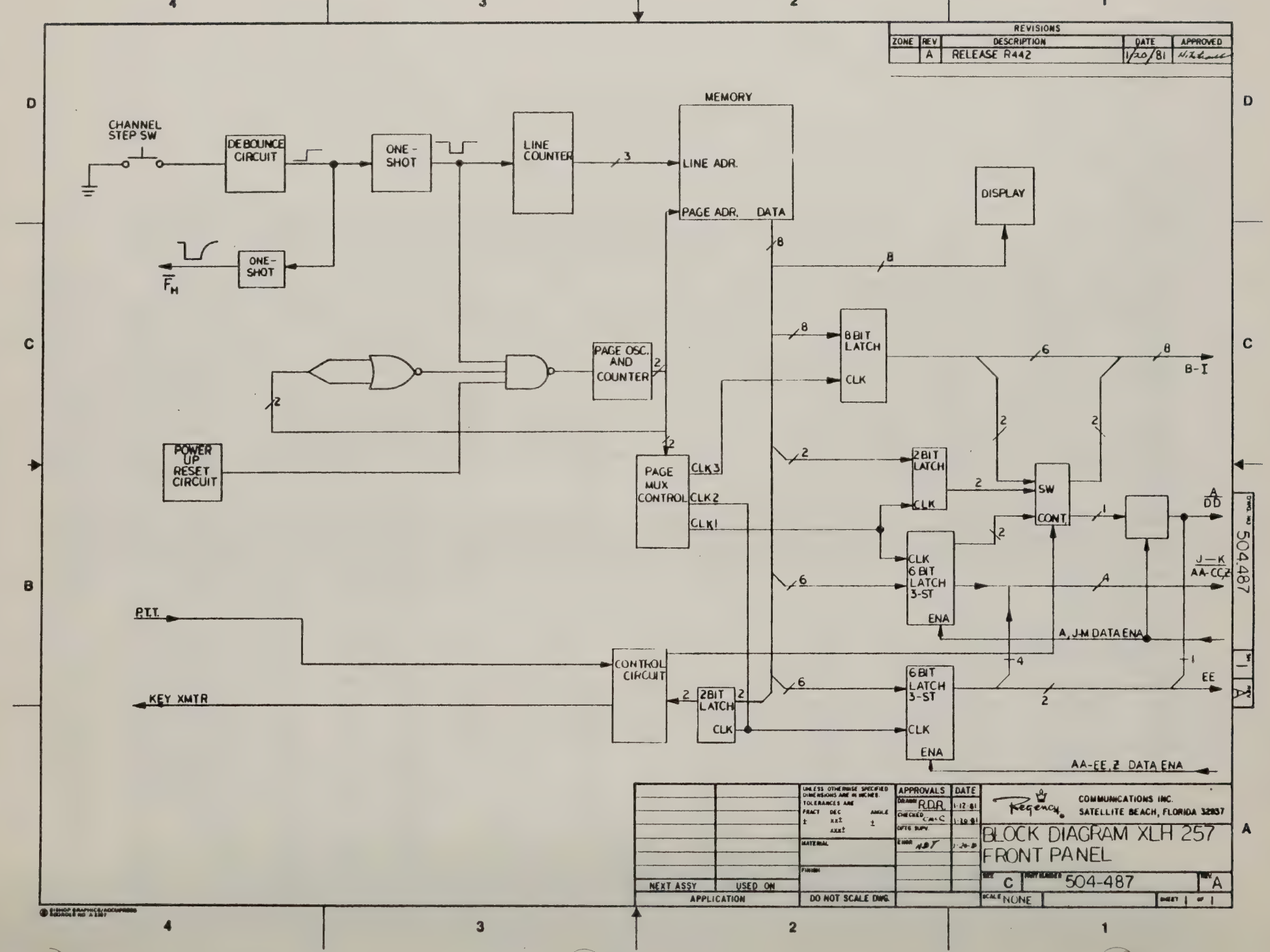

REVISIONS
ZONE | REV | DESCRIPTION | DATE | APPROVED
A | RELEASE R442 | 1/20/81
CHANNEL STEP SW
DEBOUNCE CIRCUIT
ONE-SHOT
LINE COUNTER
MEMORY
LINE ADR.
PAGE ADR. DATA
DISPLAY
ONE-SHOT
$\overline{F_H}$
PAGE OSC. AND COUNTER
8 BIT LATCH
CLK
B-I
POWER UP RESET CIRCUIT
PAGE MUX CONTROL
CLK3
CLK2
CLK1
2 BIT LATCH
CLK
SW CONT.
A DD
CLK 6 BIT LATCH 3-ST
ENA
J—K AA-CC,Z
A, J-M DATA ENA
P.T.T.
KEY XMTR
CONTROL CIRCUIT
2 BIT LATCH
CLK
6 BIT LATCH 3-ST
CLK
ENA
EE
AA-EE,Z DATA ENA
504.487
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES. TOLERANCES ARE FRACT DEC ANGLE
MATERIAL
FINISH
NEXT ASSY | USED ON
APPLICATION
DO NOT SCALE DWG.
APPROVALS | DATE
DRAWN R.D.R. 1-12-81
CHECKED C.M.C 1-20-81
QUALITY SUPV.
ENGR M.B.T 1-20-81
Regency COMMUNICATIONS INC. SATELLITE BEACH, FLORIDA 32937
BLOCK DIAGRAM XLH 257 FRONT PANEL
SIZE C | DRAWING NUMBER 504-487 | REV A
SCALE NONE | SHEET 1 OF 1

FIGURE 6-1

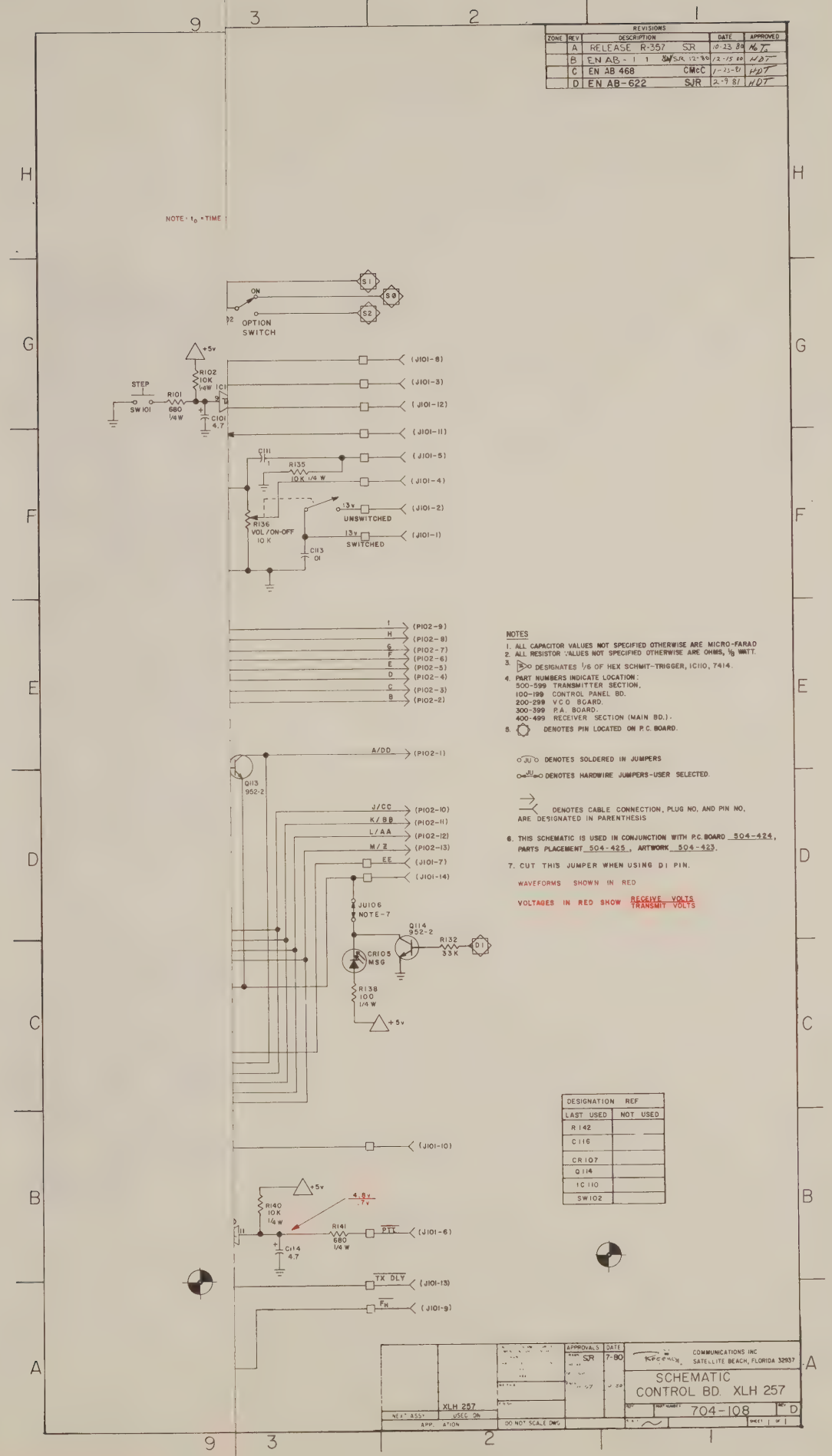

REVISIONS
ZONE REV DESCRIPTION DATE APPROVED
A RELEASE R-357 SJR 10-23-80
B EN AB-1 1 SJR 12-15-80
C EN AB 468 CMcC 1-23-81
D EN AB-622 SJR 2-9-81
NOTE: t_0 = TIME
S1
S0
S2
ON
OPTION SWITCH
+5v
R102 10K 1/4W
STEP
SW101
R101 680 1/4W
C101 4.7
(J101-8)
(J101-3)
(J101-12)
(J101-11)
C111
R135 10K 1/4 W
(J101-5)
(J101-4)
13v
UNSWITCHED
(J101-2)
R136 VOL/ON-OFF 10 K
13v
SWITCHED
(J101-1)
C113 01
(P102-9)
(P102-8)
(P102-7)
(P102-6)
(P102-5)
(P102-4)
(P102-3)
(P102-2)
A/DD
(P102-1)
Q113 952-2
J/CC
K/BB
L/AA
M/Z
EE
(P102-10)
(P102-11)
(P102-12)
(P102-13)
(J101-7)
(J101-14)
JU106 NOTE-7
Q114 952-2
R132 33K
D1
CR105 MSG
R138 100 1/4 W
+5v
NOTES
1. ALL CAPACITOR VALUES NOT SPECIFIED OTHERWISE ARE MICRO-FARAD
2. ALL RESISTOR VALUES NOT SPECIFIED OTHERWISE ARE OHMS, 1/8 WATT.
3. DESIGNATES 1/6 OF HEX SCHMIT-TRIGGER, IC110, 7414.
4. PART NUMBERS INDICATE LOCATION:
500-599 TRANSMITTER SECTION.
100-199 CONTROL PANEL BD.
200-299 V C O BOARD.
300-399 P.A. BOARD.
400-499 RECEIVER SECTION (MAIN BD.).
5. DENOTES PIN LOCATED ON P.C. BOARD.
DENOTES SOLDERED IN JUMPERS
DENOTES HARDWIRE JUMPERS-USER SELECTED.
DENOTES CABLE CONNECTION, PLUG NO, AND PIN NO, ARE DESIGNATED IN PARENTHESIS
6. THIS SCHEMATIC IS USED IN CONJUNCTION WITH P.C. BOARD 504-424, PARTS PLACEMENT 504-425, ARTWORK 504-423.
7. CUT THIS JUMPER WHEN USING D1 PIN.
WAVEFORMS SHOWN IN RED
VOLTAGES IN RED SHOW RECEIVE VOLTS / TRANSMIT VOLTS
DESIGNATION REF
LAST USED NOT USED
R142
C116
CR107
Q114
IC110
SW102
(J101-10)
+5v
4.8v
R140 10K 1/4 W
R141 680 1/4 W
PTT
(J101-6)
C114 4.7
TX DLY
(J101-13)
FH
(J101-9)
APPROVALS DATE
SJR 7-80
COMMUNICATIONS INC
SATELLITE BEACH, FLORIDA 32937
SCHEMATIC
CONTROL BD. XLH 257
704-108
REV D
SHEET 1 OF 1
XLH 257
NEXT ASSY USED ON
APPLICATION
DO NOT SCALE DWG.

FIGURE 6-2

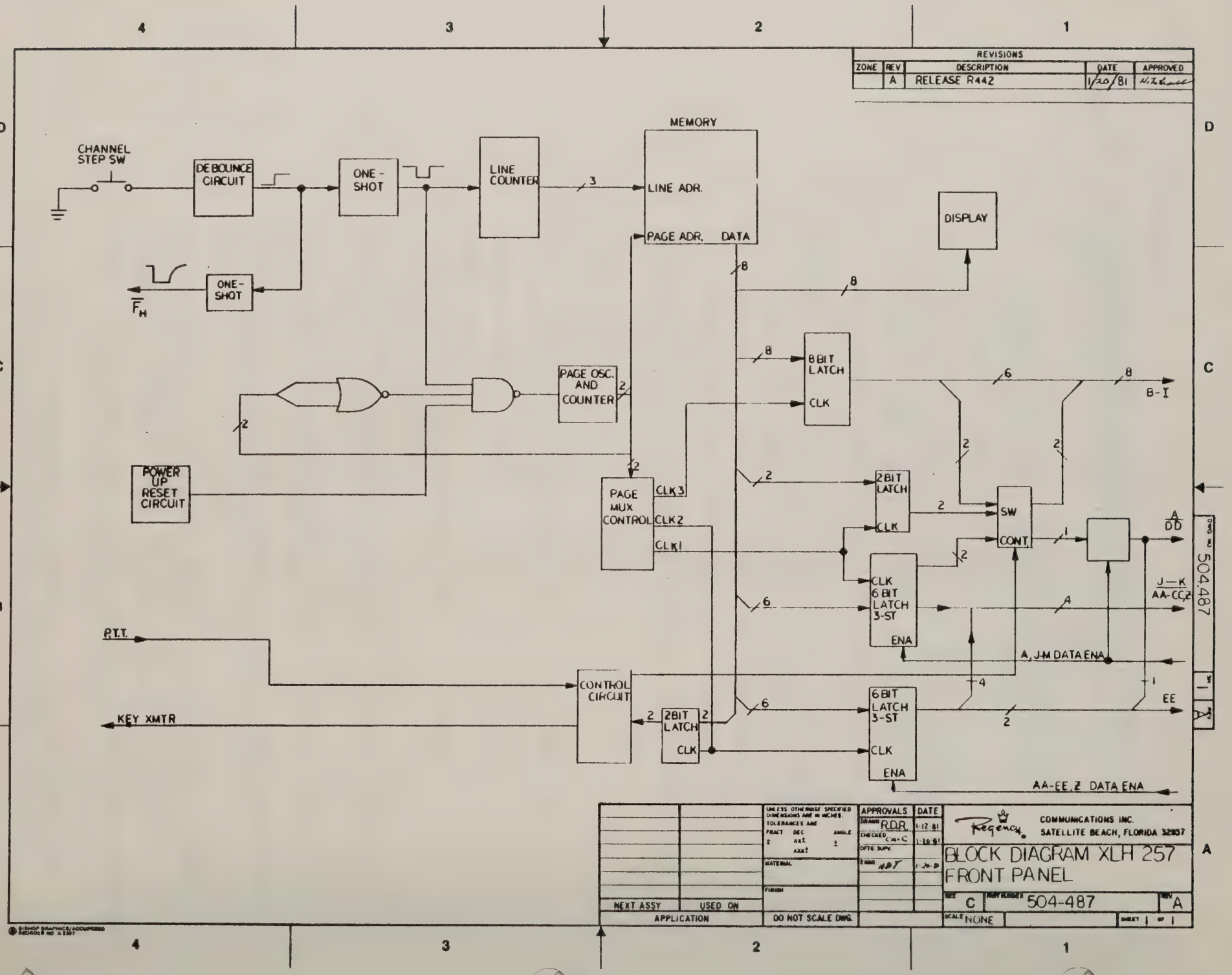

REVISIONS
ZONE REV DESCRIPTION DATE APPROVED
A RELEASE R442 1/20/81
CHANNEL STEP SW
DEBOUNCE CIRCUIT
ONE-SHOT
LINE COUNTER
MEMORY
LINE ADR.
PAGE ADR. DATA
DISPLAY
ONE-SHOT
PAGE OSC. AND COUNTER
8 BIT LATCH
CLK
B-I
POWER UP RESET CIRCUIT
PAGE MUX CONTROL
CLK3
CLK2
CLK1
2 BIT LATCH
SW CONT.
A DD
CLK 6 BIT LATCH 3-ST
ENA
J—K AA-CC2
P.T.T.
CONTROL CIRCUIT
KEY XMTR
A, J-M DATA ENA
6 BIT LATCH 3-ST
EE
AA-EE,Z DATA ENA
DWG NO 504.487
APPROVALS DATE
DRAWN R.D.R. 1-12-81
CHECKED 1-20-81
QA/TG. SUPV.
PROJ. ENG. 1-26-81
MATERIAL
FINISH
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES. TOLERANCES ARE FRACT DEC ANGLE
NEXT ASSY USED ON
APPLICATION
DO NOT SCALE DWG.
Regency COMMUNICATIONS INC. SATELLITE BEACH, FLORIDA 32937
BLOCK DIAGRAM XLH 257 FRONT PANEL
SIZE C PART NUMBER 504-487 REV A
SCALE NONE SHEET 1 OF 1

FIGURE 6-1

REVISIONS				
ZONE	REV.	DESCRIPTION	DATE	APPROVED
	A	RELEASE R-757 SJH	8-23-84	MJT
	B	EN AB-111 SWSK	2-5-85	MJT
	C	EN AB 468 CMcC	7-15-85	MJT
	D	EN AB-622 SJR	4-1-86	MJT

NOTE- t_0 = TIME WHEN THE STEP SWITCH CLOSES

PROGRAMMING TABLE

NO CHAN.	JU101	JU102	JU103
4	OUT	IN	OUT
6	IN	IN	OUT
8	X	OUT	IN

X=IRRELEVANT

RESET CIRCUIT

IC102 MEMORY

CHANNEL DISPLAY

NOTES

1. ALL CAPACITOR VALUES NOT SPECIFIED OTHERWISE ARE MICRO-FARAD
2. ALL RESISTOR VALUES NOT SPECIFIED OTHERWISE ARE OHMS, ¼ WATT
3. ▷○ DESIGNATES 1/6 OF HEX SCHMITT-TRIGGER, ICIIO, 7414
4. PART NUMBERS INDICATE LOCATION.
   500-599 TRANSMITTER SECTION.
   100-199 CONTROL PANEL BD
   200-299 VCO BOARD
   300-399 PA BOARD.
   400-499 RECEIVER SECTION (MAIN BD.).
5. ⬡ DENOTES PIN LOCATED ON P C BOARD

○JU○ DENOTES SOLDERED IN JUMPERS.

○—○ DENOTES HARDWIRE JUMPERS-USER SELECTED

DENOTES CABLE CONNECTION, PLUG NO. AND PIN NO. ARE DESIGNATED IN PARENTHESIS

6. THIS SCHEMATIC IS USED IN CONJUNCTION WITH P.C.BOARD 504-424, PARTS PLACEMENT 504-425, ARTWORK 504-423.
7. CUT THIS JUMPER WHEN USING 8: PIN.

WAVEFORMS SHOWN IN RED

VOLTAGES IN RED SHOW RECEIVE VOLTS / TRANSMIT VOLTS

DESIGNATION REF	
LAST USED	NOT USED
R142	
C116	
CR107	
Q114	
IC112	
SW102	

		APPROVALS	DATE	
		DSR	7-80	

COMMUNICATIONS INC
SATELLITE BEACH, FLORIDA 32937

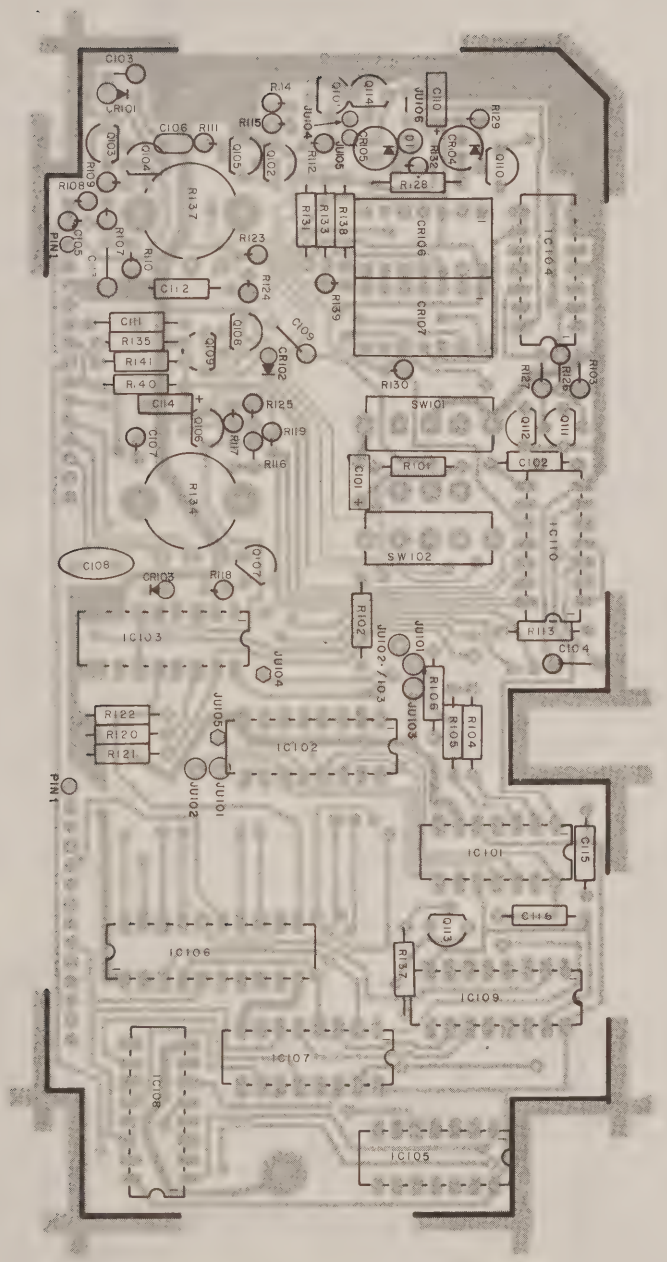
SCHEMATIC
CONTROL BD. XLH 257

XLH 257

704-108 D

SHEET 1 OF 1

FIGURE 6-2


C103
R101
R14
Q114
Q109
JU106
C110
R129
JU104
C106
R111
R115
C104
Q103
Q102
JU105
CR105
CR104
Q110
R109
R112
R132
R128
R108
R137
R131
R133
R138
CR106
IC104
C105
PIN 1
R107
R110
R123
CR107
C112
R124
R139
C111
R135
Q106
C109
R141
Q105
CR102
R140
R130
R127
R126
R103
C114
R125
SW101
Q112
Q111
C107
C106
R117
R119
R116
R134
R101
C102
C101
IC110
SW102
C108
CR103
R118
Q107
R102
JU101
R113
C104
IC103
JU104
JU102 / 103
R106
JU103
R105
R104
R122
R120
R121
JU105
IC102
JU102
JU101
PIN 1
C115
IC101
C116
Q113
IC106
R137
IC109
IC107
IC108
IC105

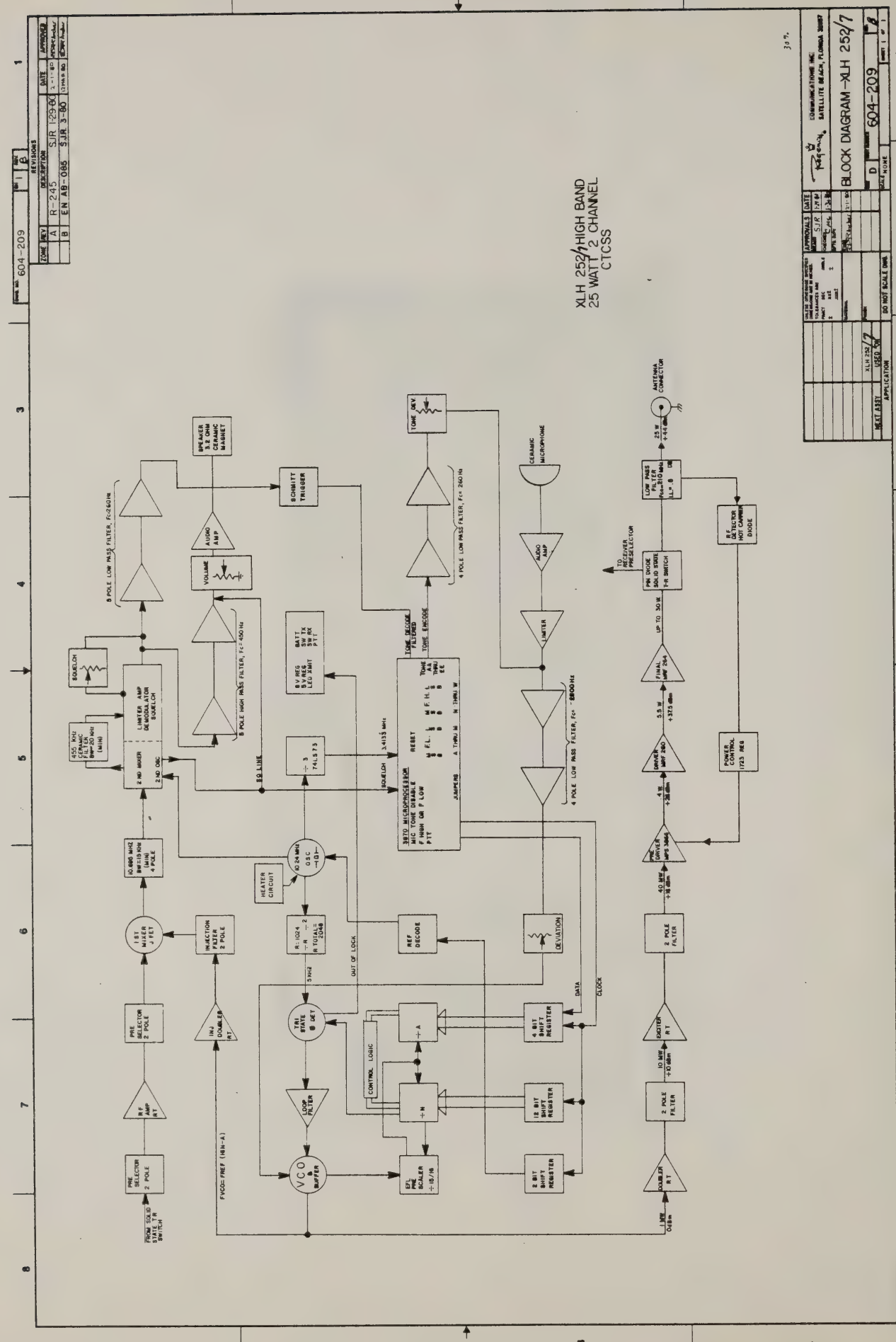
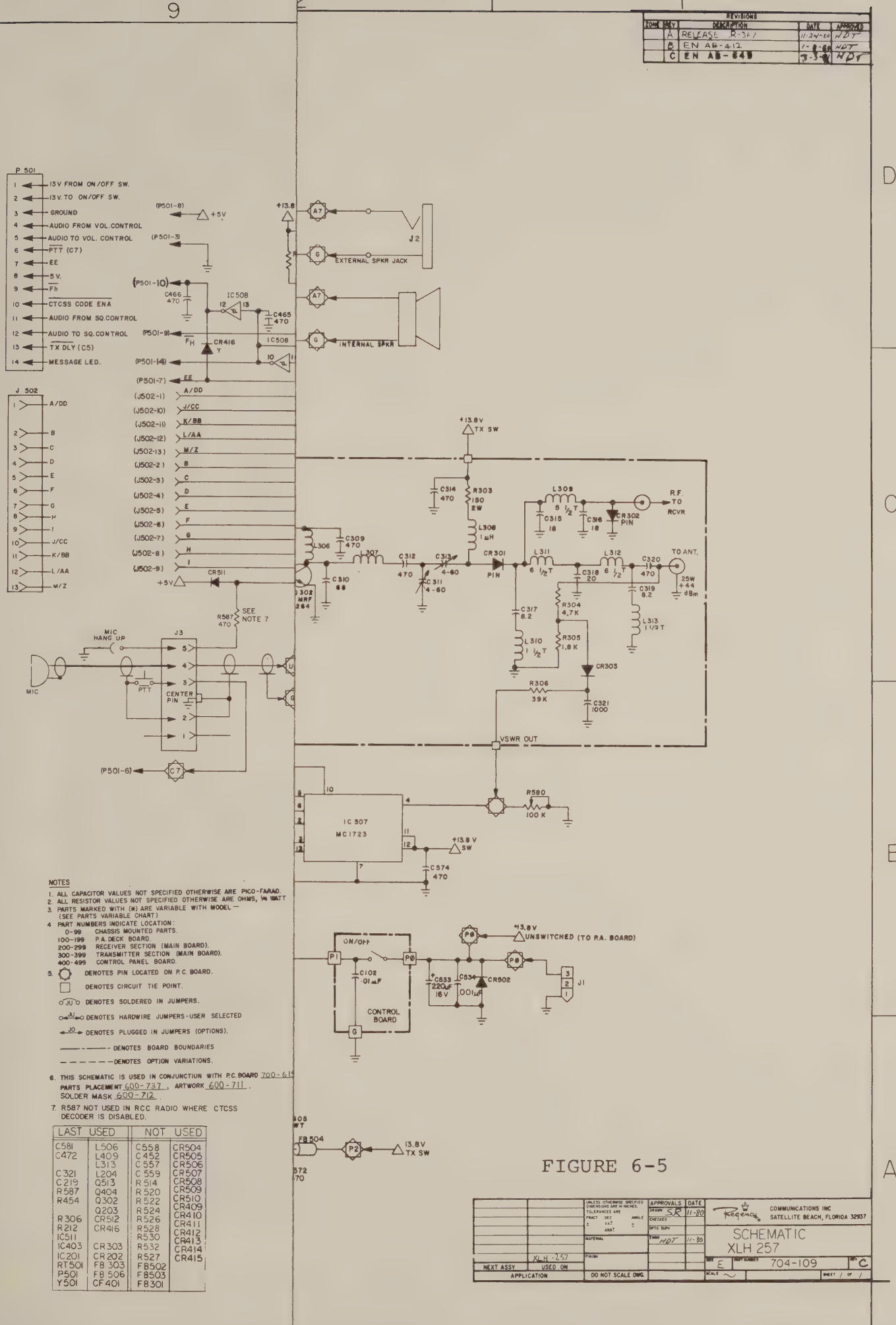

XLH 252/4 HIGH BAND
25 WATT 2 CHANNEL
CTCSS
BLOCK DIAGRAM-XLH 252/7
604-209
REVISIONS
R-245
EN AB-085
SJR 1-29-80
SJR 3-80
BREAKER
REED SWITCH
CERAMIC
MAGNET
SCHMITT
TRIGGER
AUDIO
AMP
VOLUME
8 POLE LOW PASS FILTER, Fc=2.6KHz
8 POLE HIGH PASS FILTER, Fc=450 Hz
4 POLE LOW PASS FILTER, Fc= 260 Hz
TONE DEV
CERAMIC
MICROPHONE
AUDIO
AMP
LIMITER
4 POLE LOW PASS FILTER, Fc= 3800Hz
SQUELCH
LIMITER AMP
DEMODULATOR
SQUELCH
455 KHz
FILTER
2 KHz BW
(MIN)
2 ND MIXER
2 ND OSC
10.695 MHz
CRYSTAL
(MIN)
4 POLE
1 ST
MIXER
J FET
PRE
SELECTOR
2 POLE
RF
AMP
RT
PRE
SELECTOR
2 POLE
FROM SOLID
STATE T/R
SWITCH
INJECTION
FILTER
2 POLE
INJ
DOUBLER
RT
FVCO÷ FREF (16N-A)
÷ 3
74LS73
3.4133 MHz
HEATER
CIRCUIT
10.24 MHz
OSC
+10 ppm
R-1024
÷ R
÷ 2
R TOTAL=
2048
5 KHz
OUT OF LOCK
REF
DECODE
TRI
STATE
Ø DET
LOOP
FILTER
VCO
& BUFFER
CONTROL LOGIC
÷A
÷N
PLL
SCALER
÷10/16
4 BIT
SHIFT
REGISTER
12 BIT
SHIFT
REGISTER
8 BIT
SHIFT
REGISTER
DATA
CLOCK
DEVIATION
TONE DECODE
FILTERS
TONE ENCODE
3810 MICROPROCESSOR
MIC TONE DISABLE
F HIGH OR P LOW
PTT
RESET
JUMPERS
BATT
5W TX
5W RX
PTT
8V REG
5V REG
LED XMIT
TO
RECEIVER
PRESELECTOR
PIN DIODE
SOLID STATE
T-R SWITCH
LOW PASS
FILTER
Fc=310 MHz
LL* Ø
25 W
+44 dBm
ANTENNA
CONNECTOR
RF
FILTER
HOT CARRIER
DIODE
POWER
CONTROL
1723 REG
UP TO 30 W
FINAL
AMP 254
3.5 W
+35.5 dBm
DRIVER
AMP 250
4 W
+36 dBm
PRE
DRIVER
AMP 3044
40 MW
+16 dBm
2 POLE
FILTER
EXCITER
RT
10 MW
+10 dBm
2 POLE
FILTER
DOUBLER
RT
1 MW
0 dBm
DO NOT SCALE DWG.
APPLICATION
USED ON
XLH 252/7

FIGURE 6-4



NOTES

1. ALL CAPACITOR VALUES NOT SPECIFIED OTHERWISE ARE PICO-FARAD.
2. ALL RESISTOR VALUES NOT SPECIFIED OTHERWISE ARE OHMS, ¼ WATT
3. PARTS MARKED WITH (*) ARE VARIABLE WITH MODEL — (SEE PARTS VARIABLE CHART)
4. PART NUMBERS INDICATE LOCATION:
   - 0-99 CHASSIS MOUNTED PARTS.
   - 100-199 P.A. DECK BOARD.
   - 200-299 RECEIVER SECTION (MAIN BOARD).
   - 300-399 TRANSMITTER SECTION (MAIN BOARD).
   - 400-499 CONTROL PANEL BOARD.
5. ⬡ DENOTES PIN LOCATED ON P.C. BOARD.
   □ DENOTES CIRCUIT TIE POINT.
   ○JU○ DENOTES SOLDERED IN JUMPERS.
   ○JU○ DENOTES HARDWIRE JUMPERS-USER SELECTED
   ◂JO▸ DENOTES PLUGGED IN JUMPERS (OPTIONS).
   ——·—— DENOTES BOARD BOUNDARIES
   — — — — DENOTES OPTION VARIATIONS.
6. THIS SCHEMATIC IS USED IN CONJUNCTION WITH P.C. BOARD 700-619 PARTS PLACEMENT 600-737, ARTWORK 600-711, SOLDER MASK 600-712.
7. R587 NOT USED IN RCC RADIO WHERE CTCSS DECODER IS DISABLED.

LAST USED		NOT USED	
C581	L506	C558	CR504
C472	L409	C452	CR505
	L313	C557	CR506
C321	L204	C559	CR507
C219	Q513	R514	CR508
R587	Q404	R520	CR509
R454	Q302	R522	CR510
	Q203	R524	CR409
R306	CR512	R526	CR410
R212	CR416	R528	CR411
IC511		R530	CR412
IC403	CR303	R532	CR413
IC201	CR202	R527	CR414
RT501	FB 303	FB502	CR415
P501	FB 506	FB503	
Y501	CF401	FB301	

FIGURE 6-5

			APPROVALS	DATE
		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES. TOLERANCES ARE FRACT DEC ANGLE	DRAWN SR	11-80
			CHECKED	
			QUAL SUPV	
		MATERIAL	ENGR HDT	11-80
		FINISH		
NEXT ASSY	XLH-257 USED ON			
APPLICATION		DO NOT SCALE DWG.		

COMMUNICATIONS INC
SATELLITE BEACH, FLORIDA 32937

SCHEMATIC
XLH 257

SIZE E PART NUMBER 704-109 REV C

SCALE ~ SHEET 1 OF 1

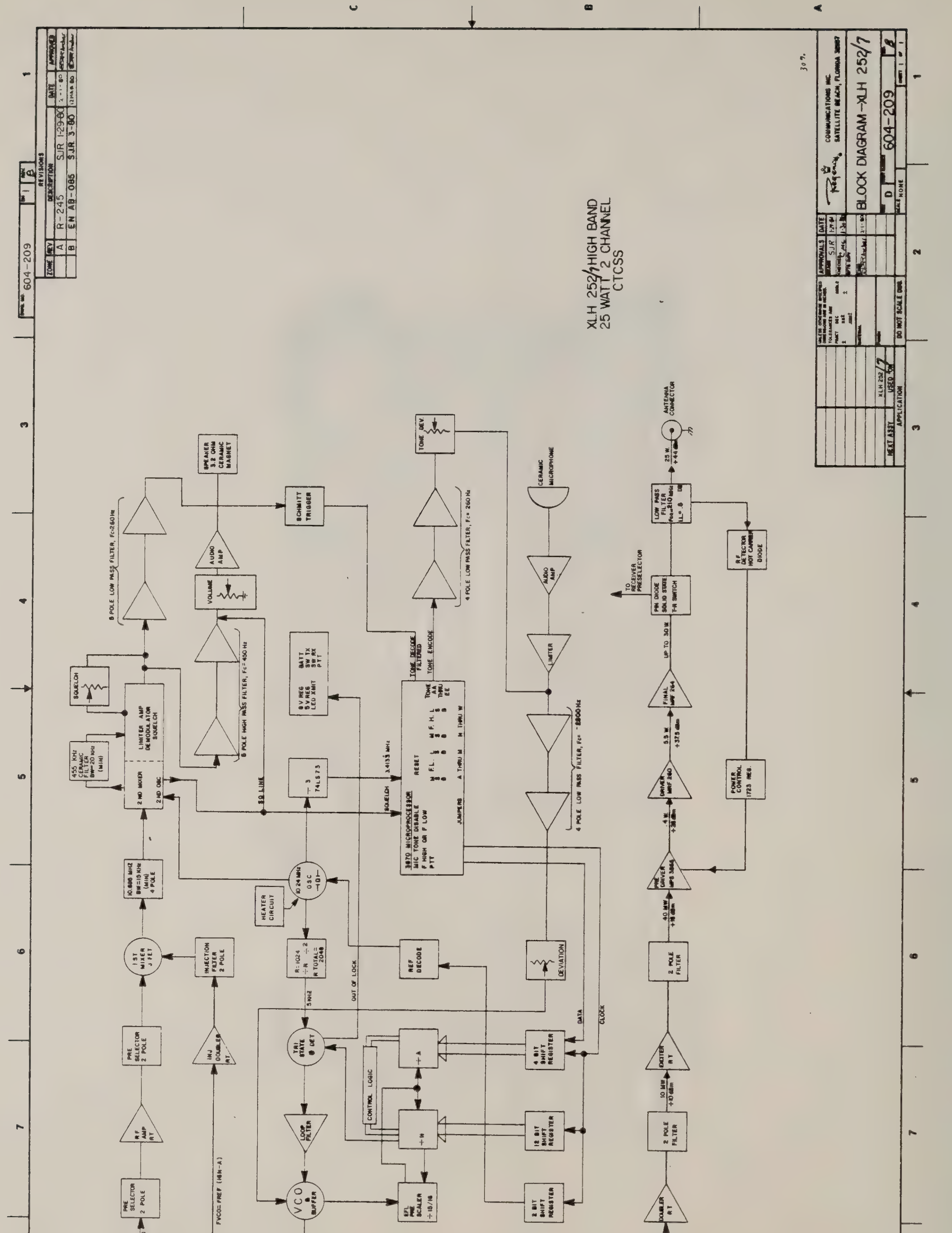

XLH 252/7 HIGH BAND
25 WATT 2 CHANNEL
CTCSS
BLOCK DIAGRAM-XLH 252/7
604-209

FIGURE 6-4

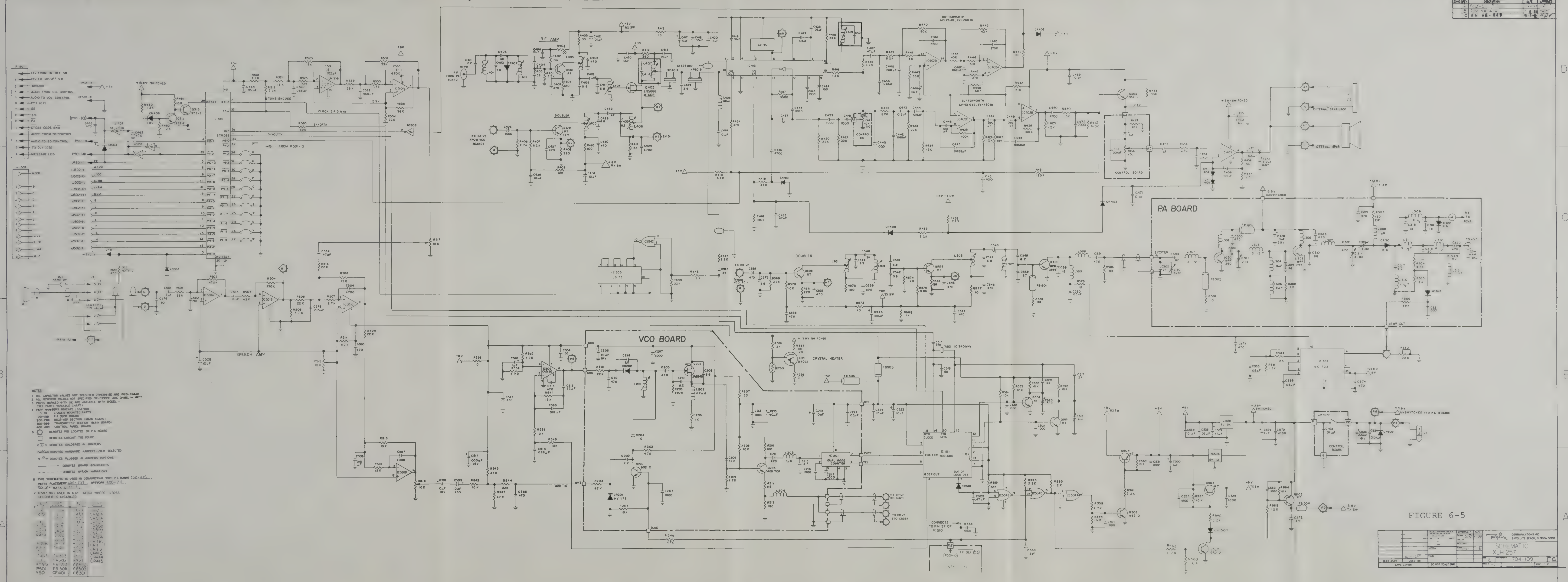

RF AMP
DOUBLER
MIXER
BUTTERWORTH
CONTROL BOARD
PA BOARD
EXCITER
SPEECH AMP
VCO BOARD
CRYSTAL HEATER
DUAL MODE COUNTER
CLOCK 3.413 MHz
TONE ENCODE
SYNDATA
SCHEMATIC
XLH-257
704-109

FIGURE 6-5

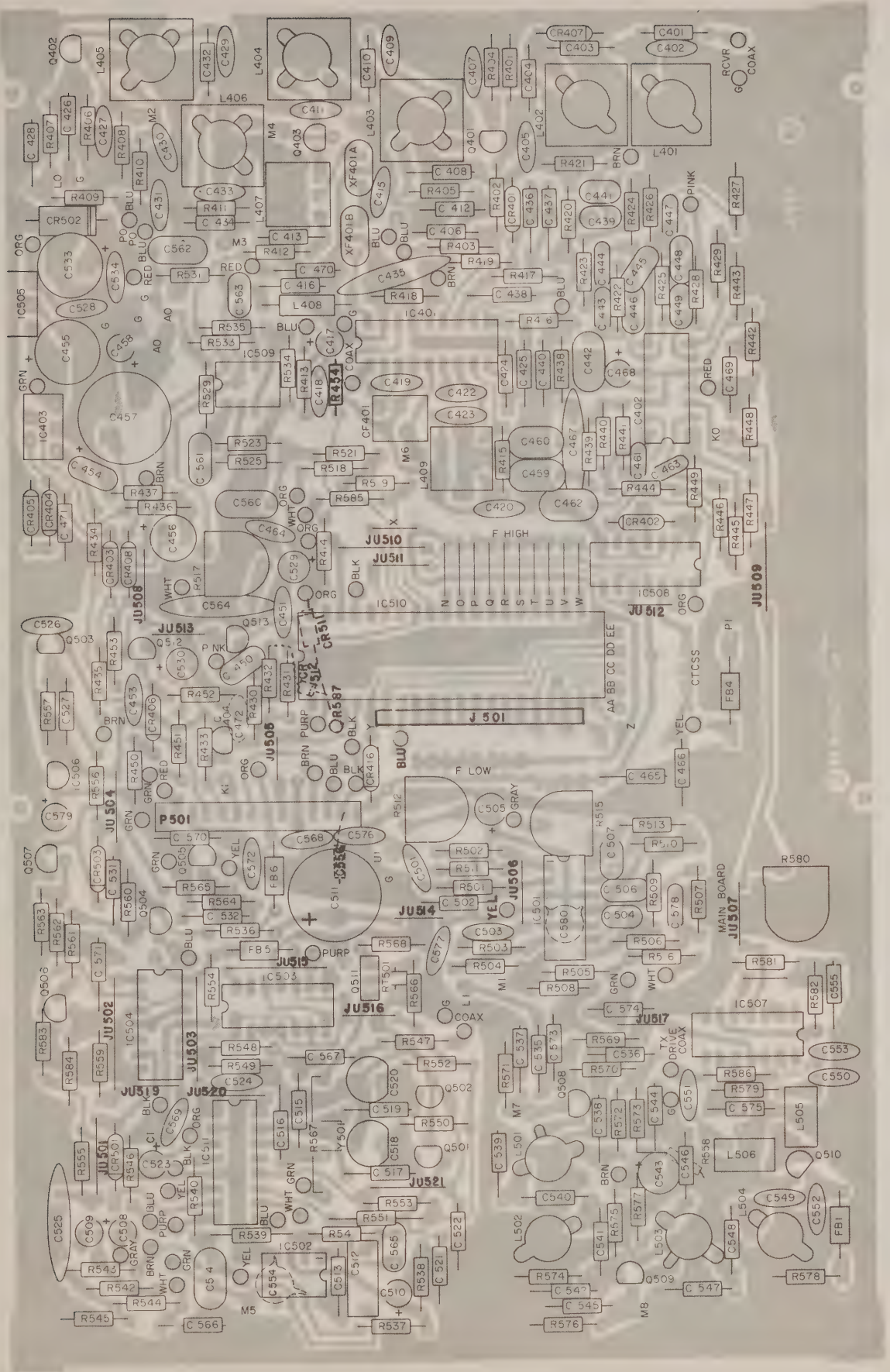

F HIGH
F LOW
J 501
P501
IC501
IC502
IC503
IC504
IC505
IC506
IC507
IC508
IC509
IC510
IC511
IC403
MAIN BOARD
JU501
JU502
JU503
JU504
JU505
JU506
JU507
JU508
JU509
JU510
JU511
JU512
JU513
JU514
JU515
JU516
JU517
JU518
JU519
JU520
JU521
RCVR
COAX
TX DRIVE COAX
CTCSS

FIGURE 6-6

FIGURE 6-8

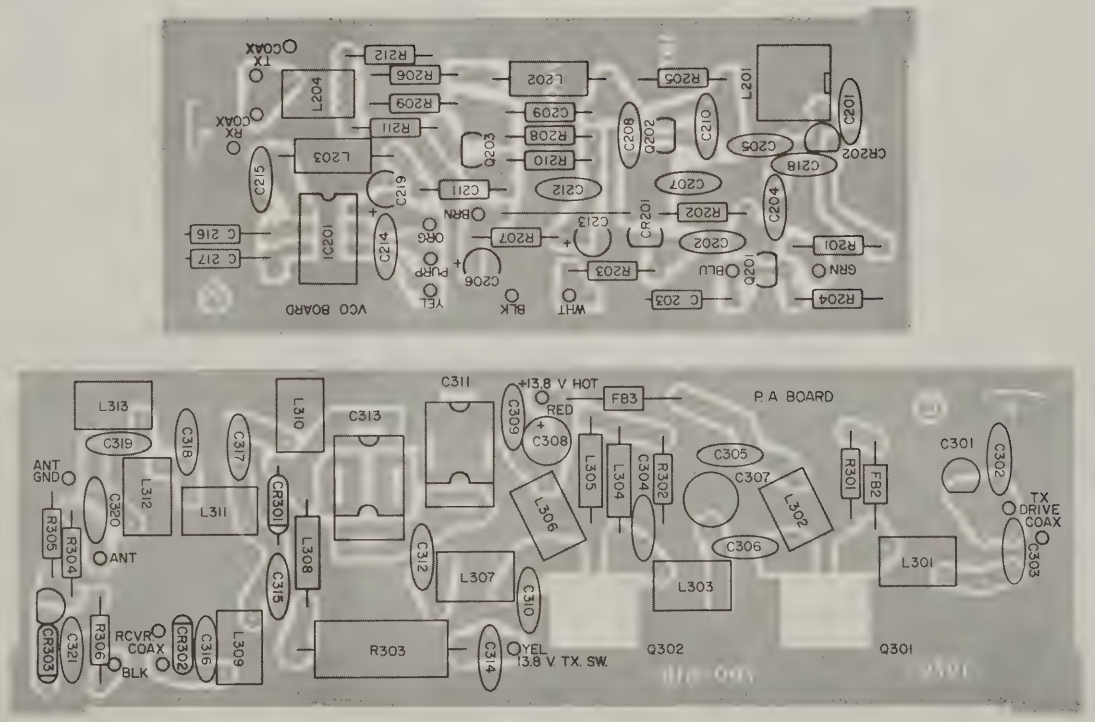


FIGURE 6-7

SECTION 7 - PARTS LIST

XLH257 CONTROL BOARD

LOCATION	DESCRIPTION	PART NUMBER	ZONE
RESISTORS (All resistors are ¼W 5% unless otherwise noted)			
R101	680 ohm	4704-0681-032	G9
R102	10K ohm	4704-0103-032	G9
R103	680 ohm 1/8W	4704-0681-031	G8
R104	10K ohm	4704-0103-032	G7
R105	10K ohm	4704-0103-032	G7
R106	470 ohm	4704-0471-032	G7
R107	100K ohm 1/8W	4704-0104-031	D9
R108	100K ohm 1/8W	4704-0104-031	D8
R109	10K ohm 1/8W	4704-0103-031	D8
R110	100K ohm 1/8W	4704-0104-031	D9
R111	56K ohm 1/8W	4704-0563-031	D8
R112	56K ohm 1/8W	4704-0563-031	E8
R113	680 ohm	4704-0681-032	E7
R114	10K ohm 1/8W	4704-0103-031	E7
R115	10K ohm 1/8W	4704-0103-031	E7
R116	15K ohm 1/8W	4704-0153-031	E6
R117	10K ohm 1/8W	4704-0103-031	E6
R118	10K ohm 1/8W	4704-0103-031	D7
R119	10K ohm 1/8W	4704-0103-031	D6
R120	1K ohm	4704-0102-032	C6
R121	1K ohm	4704-0102-032	C6
R122	1K ohm	4704-0102-032	C6
R123	100K ohm 1/8W	4704-0104-031	B9
R124	68K ohm 1/8W	4704-0683-031	B8
R125	10K ohm 1/8W	4704-0103-031	B7
R126	10K ohm 1/8W	4704-0103-031	B7
R127	10K ohm 1/8W	4704-0103-031	B7
R128	180 ohm	4704-0181-032	B8
R129	4.7K ohm 1/8W	4704-0472-031	A8
R130	4.7K ohm 1/8W	4704-0472-031	A7
R131	68 ohm	4704-0680-032	G4
R132	33K 1/8W	4704-0333-031	C2
R133	68 ohm	4704-0680-032	G4
R134	10K (L) 12.5mm	4751-3278-101	G3
R135	10K ohm	4704-0103-032	F3
R136	10K (A) w/sw	4751-3294-801	F3
R137	10K ohm	4704-0103-032	E3
R138	100 ohm	4704-0101-032	C2
R139	1K ohm 1/8W	4704-0102-031	B4
R140	10K ohm	4704-0103-032	B3
R141	680 ohm	4704-0581-032	B3
R142	4.7K ohm 1/8W	4704-0472-031	D6

LOCATION	DESCRIPTION	PART NUMBER	ZONE
CAPACITORS			
C101	Tant 4.7mf 6V 20%	1515-0479-001	G9
C102	TM .01mf 50V 20%	1539-0103-704	G9
C103	TC 470pf 50V 10%	1538-0471-601	F8
C104	TM .01mf 50V 20%	1539-0103-704	F8
C105	TM .01mf 50V 20%	1539-0103-704	D9
C106	TM .01mf 50V 20%	1539-0103-704	D8
C107	TC 560pf 50V 10%	1538-0561-601	D7
C108	CD 56pf 50V 5%	1525-0560-004	D7
C109	TM .1mf 50V 30%	1539-0104-809	B9
C110	Tant 4.7mf 6V 20%	1515-0479-001	A7
C111	TM .1mf 50V 30%	1539-0104-809	F3
C112	TC .001mf 50V 10%	1538-0102-601	F3
C113	TC .01 25V 30%	1538-0103-804	F3
C114	Tant 4.7mf 6V 20%	1515-0479-001	B3
C115	TC .001mf 50V 10%	1538-0102-601	F8
C116	TC .001mf 50V 10%	1538-0102-601	F7
INTEGRATED CIRCUITS			
IC101	74LS93	3130-3157-635	G7
IC102	16 Pin 74S288N PROM	3130-5441-501	G6
IC103	CD4051BE	3130-3193-517	C7
IC104	MC14013	3130-3157-649	B6
IC105	MC14013	3130-3157-649	D5
IC106	Octal D 74LS373	3130-5441-401	E4
IC107	16 Pin latch HD6431	3130-5441-502	D4
IC108	16 Pin latch HD6431	3130-5441-502	C4
IC109	16 Pin 74LS157	3130-5441-503	E4
IC110	7414 Hex Schmitt Inverter	3130-3157-654	F7,G9
TRANSISTORS			
Q101	SPS-952-2	4801-0000-016	E8
Q102	SPS 1476 Blu Top	4801-0000-003	E7
Q103	SPS-952-2	4801-0000-016	D8
Q104	2N5447	4801-0000-135	D8
Q105	SPS-952-2	4801-0000-016	D7
Q106	SPS 1476 Blu Top	4801-0000-003	D6
Q107	SPS 1476 Blu Top	4801-0000-003	D6
Q108	SPS-952-2	4801-0000-016	B8
Q109	SPS-952-2	4801-0000-016	B8
Q110	SPS-952-1	4801-0000-013	A8
Q111	SPS-952-2	4801-0000-016	B7
Q112	SPS-952-2	4801-0000-016	B7
Q113	SPS-952-2	4801-0000-016	E3
Q114	SPS-952-2	4801-0000-016	C2

LOCATION	DESCRIPTION	PART NUMBER	ZONE
DIODES			
CR101	IN4148 SP	4805-1241-201	D8
CR102	IN4148	4805-1241-201	G8
CR103	IN4148 SP	4805-1241-201	D7
CR104	NC7200 Led Red	4810-1282-905	B8
CR105	Led Yel	4810-1321-400	C3
CR106	Display Led 7-seg	2000-3285-600	F4
CR107	Display Led 7-seg	2000-3285-600	F4
MISCELLANEOUS			
S101	SW momentary SPDT	5113-5154-002	G9
S102	SW slide SPDT PC	5113-5154-001	G3

MECHANICAL PARTS		QUANTITY
Control Bd, PC Board 504-424	1700-5442-400	1
IC Socket 16 Pin (for PROM)	3140-3425-902	1
IC Socket 14 Pin (for display)	3140-3425-901	2
Paper spacer (for TX & MSG LEDs)	2800-1288-707	2
14 conductor solid flat cable	6008-3300-003	1
Connecting wafer assy (90° posts)	2105-3425-802	1
Knob Vol/Sq	2402-6067-201	2
Mounting bracket, front panel	1411-7061-301	1
Screw pushtite 4 x 1/4	2808-0250-030	5
Screw plastic 5 x 3/8	2816-3229-601	1
Screw sheet metal 4 x 1/4 wash H	2811-3185-600	2
Screw sheet metal 4 x 1/4 phillip Hd	2808-0250-012	4
*Front panel (modified)	1411-7061-301	1
*Insert for front panel	2403-3424-100	1

*NOTE: These parts are replaced by P/N 1411-7061-303 and 3900-3317-001

XLH257 VCO BOARD

LOCATION	DESCRIPTION	PART NUMBER	ZONE
RESISTORS	(All resistors are ¼W 5% unless otherwise noted)		
R201	22K ohm	4704-0223-032	B6
R202	4.7K ohm	4704-0472-032	A6
R203	47K ohm	4704-0473-032	A6
R204	10K ohm	4704-0103-032	A6
R205	270K ohm	4704-0274-032	B6
R206	1K ohm	4704-0102-032	B6
R207	33 ohm	4704-0330-032	B5
R208	10K ohm	4704-0103-032	B5
R209	4.7K ohm	4704-0472-032	A5
R210	100 ohm	4704-0101-032	B5
R211	68 ohm	4704-0680-032	A5
R212	180 ohm	4704-0181-032	A5
CAPACITORS			
C201	CD 470pf 50V 20%	1523-0471-002	B6
C202	Mud 2.2pf 10%	1510-0229-900	A6
C203	TC .001mf 50V 10%	1538-0102-601	A6
C204	CD 10pf 500V 10% NPO	1500-0100-605	B6
C205	CD 470pf 50V 20%	1523-0471-002	B6
C206	E U 10mf 16V	1513-0100-002	B6
C207	CD .001mf 50V +8-2	1503-0102-003	B6
C208	CD 6.8pf 500V 5% NPO	1500-0689-505	B5
C209	TC 470pf 50V 10%	1538-0471-601	A5
C210	CD 8.2pf 500V 5% NPO	1500-0829-505	B6
C211	TC 470pf 50V 10%	1538-0471-601	A5
C212	CD .001mf 50V +8-2	1503-0102-003	B5
C213	E U 10mf 16V	1513-0100-002	B5
C214	MC .05mf 25V +8-2	1502-0503-004	B5
C215	CD 4.7pf 500V 10% NPO	1500-0479-905	A5
C216	TC .001mf 50V 10%	1538-0102-601	A5
C217	TC .001mf 50V 10%	1538-0102-601	A5
C218	CD 9pf 500V 5% NPO	1500-0090-505	B6
C219	E U 10mf 16V	1513-0100-002	B5
DIODES			
CR201	MV1172 varicap	4809-0000-001	A6
CR202	MV2107 varicap	4809-0000-011	B6
COILS			
L201	coil 10mm	1800-5149-704	B6
L202	choke 4.7uhy	1803-3268-211	B6
L203	choke 1.0uhy	1803-3268-210	A5
L204	choke LM-2	1803-5125-902	A5

LOCATION	DESCRIPTION	PART NUMBER	ZONE
TRANSISTORS			
Q201	SPS-952-2	4801-0000-016	A6
Q202	Trans Jnct Fet Graded	4811-0000-020	B6
Q203	SPS1473 Red Top	4801-0000-035	A5
INTEGRATED CIRCUIT			
IC201	Mod Counter	3130-6060-605	A5

MECHANICAL PARTS		QUANTITY
Spacer	2800-1325-701	4
Screw phillips 6-32 x 1/4	2807-3298-001	8

XLH257 POWER AMPLIFIER BOARD

LOCATION	DESCRIPTION	PART NUMBER	ZONE
RESISTORS	(All resistors are ¼W 5% unless otherwise noted)		
R301	10 ohm	4704-0100-032	C3
R302	10 ohm	4704-0100-032	C2
R303	150 0hm 2W 10%	4700-0151-046	C2
R304	4.7K ohm	4704-0472-032	C1
R305	1.8K ohm	4704-0182-032	C1
R306	39K ohm	4704-0393-032	C1
CAPACITORS			
C301	Trim 6-2pf Red	1517-3295-303	C3
C302	CD 27pf 50V 5% NPO	1500-0270-550	C3
C303	RD 82pf 50V 5% NPO	1524-0820-002	C3
C304	RD 56pf 50V 5% NPO	1524-0560-002	C2
C305	CD 470pf 50V 20%	1523-0471-002	C2
C306	CD 18pf 500V 5%	1500-0180-505	C2
C307	Trim 2-18pf	1517-0000-001	C2
C308	E U 10mf 25V	1513-0100-003	C2
C309	CD 470pf 50V 20%	1523-0471-002	C2
C310	RD 68pf 50V 5% NPO	1524-0680-002	C2
C311	Trim 4-60pf	1517-0000-002	C2
C312	SM 470pf 50V 5%	1506-0471-550	C2
C313	Trim 4-60pf EL404 PC	1517-0000-002	C2
C314	CD 470pf 50V 20%	1523-0471-002	C2
C315	CD 18pf 500V 5%	1500-0180-505	C2
C316	CD 18pf 500V 5%	1500-0180-505	C1
C317	CD 8.2pf 500V 5% NPO	1500-0829-505	C2
C318	CD 20pf 500V 10%	1500-0200-605	C1
C319	CD 8.2pf 500V NPO	1500-0829-505	C1
C320	SM 470pf 50V 5%	1506-0471-550	C1
C321	CD .001mf 50V +8-2	1503-0102-003	B1
DIODES			
CR301	PIN UM9484	4815-3408-600	C1
CR302	PIN UM9484	4815-3408-600	C1
CR303	Hot Carrier MBD201	4816-3302-200	C1
COILS			
FB301	not used		
FB302	ferrite bead w/lead	2502-3293-901	C3
FB303	ferrite bead w/lead	2502-3293-901	C2
L301	choke LM-2 2.5T	1803-5125-901	C3
L302	choke LM-2 10.5T	1803-5125-912	C3
L303	choke LM-2 3½T	1803-5125-906	C2
L304	choke 1.8uhy	1803-3268-208	C2
L305	choke 1.8uhy	1803-3268-208	C2
L306	choke LM-2 7.5T	1803-5125-913	C2
L307	choke LM-2 2.5T	1803-5125-901	C2
L308	choke 1.0uhy	1803-3268-210	C2
L309	choke LM-2 5.5T	1803-5125-905	C1

LOCATION	DESCRIPTION	PART NUMBER	ZONE
L310	choke molded 1½ turns	1803-5125-907	C1
L311	choke LM-2 6.5T	1803-5125-909	C1
L312	choke LM02 6.5T	1803-5125-909	C1
L313	choke molded 1½ turns	1803-5125-907	C1
TRANSISTORS			
Q301	RF MRF260	4804-3411-801	C3
Q302	RF MRF264	4804-3411-802	C2

MECHANICAL PARTS		QUANTITY
Screw 6-32 x 3/8 phillip	3807-3298-002	7
Spacer (for Q301 & Q302)	2800-1328-800	2
Spacer	2800-3301-101	1
Heatsink (Q301)	5400-3301-200	1
Heatsink (Q302)	5400-3301-300	1

XLH257 RECEIVER SECTION

LOCATION	DESCRIPTION	PART NUMBER	ZONE
RESISTORS	(All resistors are ¼W 5% unless otherwise noted)		
R401	8.2K ohm	4704-0822-032	D6
R402	10K ohm	4704-0103-032	D6
R403	100 ohm	4704-0101-032	D6
R404	680 ohm	4704-0681-032	D6
R405	100 ohm	4704-0101-032	D6
R406	2.7K ohm	4704-0272-032	D7
R407	8.2K ohm	4704-0822-032	D7
R408	390 ohm	4704-0391-032	C6
R409	100 ohm	4704-0101-032	C6
R410	100 ohm	4704-0101-032	C6
R411	1.2K ohm	4704-0122-032	C6
R412	390 ohm	4704-0391-032	D6
R413	10 ohm	4704-0100-032	D6
R414	4.7K ohm	4704-0472-032	C5
R415	68K ohm	4704-0683-032	D5
R416	1.2K ohm	4704-0122-032	D5
R417	330K ohm	4704-0334-032	D5
R418	180K ohm	4704-0184-032	C5
R419	47K ohm	4704-0473-032	C5
R420	22K ohm	4704-0223-032	C5
R421	22K ohm	4704-0223-032	C5
R422	8.2K ohm	4704-0822-032	D4
R423	22K ohm	4704-0223-032	C4
R424	15K ohm	4704-0153-032	C4
R425	100K ohm	4704-0104-032	C4
R426	1.2K ohm	4704-0122-032	C4
R427	15K ohm	4704-0153-032	C4
R428	100K ohm	4704-0104-032	D4
R429	1.2K ohm	4704-0122-032	D4
R430	15K ohm	4704-0153-032	D3
R431	180K ohm	4704-0184-032	C4
R432	470K ohm	4704-0474-032	D3
R433	100K ohm	4704-0104-032	D3
R434	4.7K ohm	4704-0472-032	D3
R435	2.2K ohm	4704-0222-032	C4
R436	150 ohm	4704-0151-032	C2
R437	2.7 ohm	4704-0279-032	C2
R438	4.7K ohm	4704-0472-032	D5
R439	8.2K ohm	4704-0822-032	D4
R440	180K ohm	4704-0184-032	D4
R441	15K ohm	4704-0153-032	D4
R442	51K ohm	4704-0513-032	D4
R443	33K ohm	4704-0333-032	D4
R444	43K ohm	4704-0433-032	D4
R445	43K ohm	4704-0433-032	D4

LOCATION	DESCRIPTION	PART NUMBER	ZONE
R446	51K ohm	4704-0513-032	D4
R447	27K ohm	4704-0273-032	D4
R448	68K ohm	4704-0683-032	D4
R449	100 ohm	4704-0101-032	D4
R450	1.2K ohm	4704-0122-032	D9
R451	10K ohm	4704-0103-032	D9
R452	1.2K ohm	4704-0122-032	D9
R453	2.2K ohm	4704-0222-032	C4
R454	470 ohm	4704-0471-032	D5
CAPACITORS			
C401	Mud 2.2pf 10%	1510-0229-900	D7
C402	CD 5.6pf 500V 5%	1500-0569-505	D7
C403	Mud .39pf 10%	1510-0398-900	D7
C404	TC 8.2pf 50V 10%	1538-0829-608	D6
C405	CD 39pf 50V 5%	1500-0390-550	D6
C406	TC .01 25V 30%	1538-0103-804	D6
C407	CD 470pf 50V 20%	1523-0471-002	D6
C408	TC 470pf 50V 10%	1538-0471-601	D6
C409	CD 5.6pf 500V 5%	1500-0569-505	D6
C410	Mud .39pf 10%	1510-0398-900	D6
C411	CD 6.8pf 500V 5%	1500-0689-505	D6
C412	TC .01 25V 30%	1538-0103-804	D6
C413	TC .01 25V 30%	1538-0103-804	D6
C414	Part of L407, 82pf		D6
C415	CD 3.9pf .25pf 500V	1500-0399-205	D6
C416	TC .01 25V 30%	1538-0103-804	D5
C417	E U 10mf 16V	1513-0100-002	D6
C418	MC .05mf 25V +8-2	1502-0503-004	D6
C419	.01uf 50V	1502-0103-007	D5
C420	MC .2mf 12V +8-2	1502-0204-006	D5
C421	Part of L409, 180pf		D5
C422	MC .05mf 25V T8-2	1502-0503-004	D5
C423	MC .05mf 25V T8-2	1502-0503-004	D5
C424	TC 150pf 50V Y5P	1538-0151-601	D5
C425	TC .001mf 50V 10%	1538-0102-601	D5
C426	TC .001mf 50V 10%	1538-0102-601	D7
C427	CD 470pf 50V 20%	1523-0471-002	D6
C428	TC .01 25V 30%	1538-0103-804	C7
C429	CD 6.8pf 500V 5%	1500-0688-505	D6
C430	CD 470pf 50V 20%	1523-0471-002	D6
C431	.01uf CD 50V	1502-0103-007	C6
C432	Mud .47pf 10%	1510-0478-900	D6
C433	CD 8.2pf 500V 5%	1500-0829-505	D6
C434	TC 4700pf 50V 10%	1538-0472-626	D6
C435	MC .47mf +8-2	1502-0474-006	C5
C436	TC 4700pf 50V 10%	1538-0472-626	C5
C437	TC 68pf 50V 5%	1538-0680-509	D5
C438	TC .001mf 50V 10%	1538-0102-601	D5
C439	MY .001mf 100V 5%	1508-0102-510	D5
C440	TC .001mf 50V 10%	1538-0102-601	D5
C441	MY .001mf 100V 5%	1508-0102-510	D5
C442	MY .068mf 100V 10%	1508-0683-610	D4
C443	MY .015mf 100V 5%	1508-0153-510	D4
C444	MY .015mf 100V 5%	1508-0153-510	D4

LOCATION	DESCRIPTION	PART NUMBER	ZONE
C445	MY .0068mf 100V 10%	1508-0682-610	C4
C446	MY .015mf 100V 5%	1508-0153-510	D4
C447	MY .015mf 100V 5%	1508-0153-510	D4
C448	MY .0068 100V 10%	1508-0682-610	C4
C449	MY .015mf 100V 5%	1508-0153-510	D4
C450	MY .0047mf 100V 5%	1508-0472-510	D3
C451	CD .001mf 50V +8-2	1503-0102-003	C4
C452	not used		
C453	MC .1mf 12V 20%	1502-0104-005	C3
C454	MY .015mf 100V 5%	1508-0153-510	C3
C455	E 220mf 16V	1513-3254-711	D2
C456	E U 100mf 10V	1513-0101-001	C2
C457	E 1000mf 16V	1513-3254-704	C2
C458	Tant 2.2mf 25V 20%	1515-0229-005	C2
C459	MY .068mf 100V 10%	1508-0683-610	D4
C460	MY .068mf 100V 10%	1508-0683-610	D4
C461	MY .0022mf 100V 5%	1508-0222-510	D4
C462	MY .068mf 100V 10%	1508-0683-610	D4
C463	MY .0027mf 100V 5%	1508-0272-510	D4
C464	MC .05mf 25V +8-2	1502-0503-004	D8
C465	TC 470pf 50V 10%	1538-0471-601	D9
C466	TC 470pf 50V 10%	1538-0471-601	D9
C467	MC .47mf +8-2	1502-0474-006	D4
C468	E U 10mf 16V	1513-0100-002	D4
C469	TC .01 25V 30%	1538-0103-804	D3
C470	TC .01 25V 30%	1538-0103-804	D6
C471	TC .01 25V 30%	1538-0103-804	C3
C472	CD .002 50V 20%	1523-0202-002	D3
INTEGRATED CIRCUITS			
IC401	IF Sub Sys	3130-6056-500	D5
IC402	LM2902N	3130-3157-637	D4
IC403	TDA2002AV	3130-5407-602	D2
TRANSISTORS			
Q401	SPS 1743 Red Top	4801-0000-035	D6
Q402	SPS 1743 Red Top	4801-0000-035	C6
Q403	Junct FET 2N5668	4811-0000-030	D6
Q404	SPS-952-2	4801-0000-016	D3
DIODES			
CR401	IN4148 SP	4805-1241-201	C5
CR402	Germ	4807-1233-900	D4
CR403	IN4148	4805-1241-200	C3
CR404	IN4148 SP	4805-1241-201	C3
CR405	IN4148	4805-1241-200	C3
CR406	Zener 6.8V 5 IN5235B	4808-0000-042	D9
CR407	IN4148	4805-1241-200	D7
CR408	IN4148	4805-1241-200	C4

LOCATION	DESCRIPTION	PART NUMBER	ZONE
CR409	Not used		
CR410	Not used		
CR411	Not used		
CR412	Not used		
CR413	Not used		
CR414	Not used		
CR415	Not used		
CR416	Germ	4807-1233-900	C9
COILS			
L401	RF input Org	1800-3152-020	D7
L402	RF input Org	1800-3152-020	D7
L403	RF	1800-3152-036	D6
L404	RF	1800-3152-037	D6
L405	RF	1800-3152-037	D6
L406	RF	1800-3152-037	D6
L407	10mm 3-150 MHz	1800-6055-902	D6
L408	Choke 39 uhy	1803-3268-201	D5
L409	455 KHz	1800-6055-801	D5
MISCELLANEOUS			
CF401	Cer filter CFU-544Dz	2700-3209-500	D5
XF401A	xtal filter 10.695 MHz	2705-3299-900	D6
XF401B	xtal filter 10.695 MHz	2705-32990900	D6
	shield cans	2508-1288-901	

MAIN BOARD

XLH257 TRANSMITTER SECTION

LOCATION	DESCRIPTION	PART NUMBER	ZONE
RESISTORS	(All resistors are ¼W 5% unless otherwise noted)		
R501	36K ohm	4704-0363-032	C8
R502	470K ohm	4704-0474-032	C8
R503	43K ohm	4704-0433-032	C8
R504	330K ohm	4704-0334-032	C8
R505	22K ohm	4704-0223-032	C8
R506	15K ohm	4704-0153-032	C8
R507	2.7K ohm	4704-0272-032	C8
R508	4.7K ohm	4704-0472-032	B8
R509	22K ohm	4704-0223-032	B7
R510	15K ohm	4704-0153-032	A7
R511	4.7K ohm	4704-0472-032	B8
R512	10K var	4751-0103-001	B8
R513	15K ohm	4704-0153-032	B7
R514	Not used		
R515	10K var	4751-0103-001	A7
R516	22K ohm	4704-0223-032	C8
R517	10K var	4751-0103-001	C7
R518	4.7K ohm	4704-0472-032	D8
R519	2.2K ohm	4704-0222-032	D8
R520	Not used		
R521	18K	4704-0183-032	D8
R522	Not used		
R523	18K	4704-0183-032	D8
R524	Not used		
R525	12K ohm	4704-0123-032	D8
R526	Not used		
R527	Not used		
R528	Not used		
R529	39K ohm	4704-0393-032	D8
R530	Not used		
R531	39K ohm	4704-0393-032	D7
R532	Not used		
R533	27K ohm	4704-0273-032	D7
R534	22K ohm	4704-0223-032	D7
R535	36K ohm	4704-0363-032	D7
R536	10 ohm	4704-0100-032	B7
R537	4.7K ohm	4704-0472-032	B7
R538	2.2K ohm	4704-0222-032	B7
R539	10K ohm	4704-0103-032	B6
R540	10K ohm	4704-0103-032	B6
R541	15K ohm	4704-0153-032	B6
R542	10K ohm	4704-0103-032	A7
R543	47K ohm	4704-0473-032	A7
R544	22K ohm	4704-0223-032	A7
R545	47K ohm	4704-0473-032	A7
R546	4.7K ohm	4704-0472-032	A6
R547	2.2K ohm	4704-0223-032	C5
R548	1.2K ohm	4704-0122-032	C6

LOCATION	DESCRIPTION	PART NUMBER	ZONE
R549	22K ohm	4704-0223-032	C6
R550	10K ohm	4704-0103-032	B3
R551	10K ohm	4704-0103-032	B4
R552	10K ohm	4704-0103-032	B4
R553	10K ohm	4704-0103-032	B4
R554	2.2K ohm	4704-0222-032	A4
R555	22K ohm	4704-0223-032	A4
R556	2.2K ohm	4704-0222-032	A2
R557	10K ohm	4704-0103-032	A3
R558	1K ohm	4704-0102-032	B4
R559	4.7K ohm	4704-0472-032	A3
R560	10K ohm	4704-0103-032	A3
R561	2.2K ohm	4704-0222-032	A3
R562	1.2K ohm	4704-0122-032	A3
R563	10K ohm	4704-0103-032	A3
R564	10K ohm	4704-0103-032	A2
R565	1.2K ohm	4704-0122-032	A2
R566	2.0K ohm	4704-0202-032	B5
R567	100 ohm WW 2W 5%	4707-0101-031	B5
R568	2.7 ohm	4704-0279-032	B5
R569	2.2K ohm	4704-0223-032	B5
R570	10K ohm	4704-0103-032	B5
R571	220 ohm	4704-0221-032	B5
R572	100 ohm	4704-0101-032	B5
R573	10 ohm	4704-0100-032	B5
R574	1.2K ohm	4704-0122-032	B4
R575	6.8K ohm	4704-0682-032	B4
R576	39 ohm	4704-0390-032	B4
R577	10 ohm	4704-0100-032	B4
R578	56 ohm	4704-0560-032	B4
R579	10 ohm	4704-0100-032	B3
R580	100K var	4751-1014-012	B1
R581	1.2K ohm	4704-0122-032	B2
R582	1.2K ohm	4704-0122-032	B2
R583	1.2K ohm	4704-0122-032	A3
R584	10K ohm	4704-0103-032	A3
R585	39K ohm	4704-0393-032	D8
R586	10K ohm	4704-0103-032	C3

CAPACITORS

C501	MC .2mf 12V +8-2	1502-0204-006	C9
C502	TC 150pf 50V 10%	1538-0151-601	B8
C503	MY .01mf 100V 5%	1508-0103-510	B8
C504	MY .0047mf 100V 5%	1508-0472-510	C8
C505	E U 10mf 16V	1513-0100-002	B8
C506	MY .015mf 100V 5%	1508-0153-510	A8
C507	MY .001mf 100V 5%	1508-0102-510	A7
C508	E U 10mf 16V	1513-0100-002	A7
C509	E U 10mf 16V	1513-0100-002	A7
C510	E U 1mf 50V	1513-0010-004	B7
C511	E 1000mf 16V	1513-3254-704	A7
C512	MY .22mf	1508-3300-302	B6

LOCATION	DESCRIPTION	PART NUMBER	ZONE
C513	TC 470pf 50V 10%	1538-0471-601	B6
C514	MY .068mf 100V 10%	1508-0683-610	A7
C515	TC 470pf 50V 10%	1538-0471-601	B4
C516	TC 68pf 50V 5%	1538-0689-608	B4
C517	TC 24pf 50V 5%	1538-0240-508	B3
C518	Trim 4-11pf IVW	1517-3295-302	B3
C519	TC 33pf 50V 5%	1538-0330-508	B4
C520	Trim 4-11pf IVW	1517-3295-302	B4
C521	TC .001mf 50V 10%	1538-0102-601	B4
C522	TC .001mf 50V 10%	1538-0102-601	B4
C523	E U 10mf 16V	1513-0100-002	B4
C524	MC .05mf 25V +8-2	1502-0503-004	B5
C525	MC .47mf +8-2	1502-0474-006	A4
C526	CD .001mf 50V +8-2	1503-0102-003	A3
C527	TC .001mf 50V 10%	1538-0102-601	A3
C528	MC .05mf 25V +8-2	1502-0503-004	A3
C529	E U 47mf 10V	1513-0470-001	A3
C530	E U 1mf 50V	1513-0010-004	A3
C531	TC .001mf 50V 10%	1538-0102-601	A3
C532	TC .001mf 50V 10%	1538-0102-601	A2
C533	E 220mf 16V	1513-3254-711	A2
C534	TC .001mf 50V	1538-0102-601	B2
C535	TC 470pf 50V 10%	1538-0471-601	C5
C536	TC 470pf 50V 10%	1538-0471-601	35
C537	TC 470pf 50V 10%	1538-0471-601	B5
C538	TC 470pf 50V 10%	1538-0471-601	B5
C539	TC 3.3pf 50V 10%	1538 0339-608	C5
C540	Mud .39pf 10%	1510-0398-900	C5
C541	TC 6.8pf 50V 10%	1538-0689-608	C4
C542	TC 3.9pf 50V 10%	1538-0399-608	B4
C543	E U 100mf 10V	1513-0101-001	B4
C544	TC 470pf 50V 10%	1538-0471-601	B4
C545	TC 470pf 50V 10%	1538-0471-601	C4
C546	TC 470pf 50V 10%	1538-0471-601	C4
C547	TC 6.8pf 50V 10%	1538-0689-608	C4
C548	Mud .47pf 10%	1510-0478-900	C4
C549	CD 8.2pf 500V 10%	1500-0829-905	C4
C550	MC .05mf 25V +8-2	1502-0503-004	B3
C551	CD 470pf 50V 20%	1523-0471-002	C3
C552	CD 27pf 50V 10%	1500-0270-650	C4
C553	MC .05mf 25V +8-2	1502-0503-004	B2
C554	CD 150pf 50V 20%	1523-0151-002	B6
C555	MC .05mf 25V +8-2	1502-0503-004	B2
C556	TC .001mf 50V 10%	1538-0102-601	A4
C557	Not used		
C558	Not used		
C559	Not used		
C560	MY .068mf 1-0V 10%	1508-0683-610	D8
C561	MY .022mf 100V 5%	1508-0223-510	D8
C562	MY .068mf 100V 10%	1508-0683-610	D7
C563	MY .0047mf 100V 5%	1508-0472-510	D7
C564	MC .47mf +8-2	1502-0474-006	C8
C565	MY .015mf 100V 5%	1508-0153-510	B6

LOCATION	DESCRIPTION	PART NUMBER	ZONE
C566	TC 470pf 50V 10%	1538-0471-601	A7
C567	TC 24pf 50V 5%	1538-0240-508	C5
C568	CD .01mf 50V 80-20	1502-0103-007	B3
C569	MC .2mf 12V +8-2	1502-0204-006	A4
C570	TC .001mf 50V 10%	1538-0102-601	B2
C571	TC .001mf 50V 10%	1538-0102-601	A3
C572	CD 470pf 50V 20%	1523-0471-002	A2
C573	TC 6.8pf 50V 10%	1538-0689-608	C5
C574	TC 470pf 50V 10%	1538-0471-601	B2
C575	TC 470pf 50V 10%	1538-0471-601	B2
C576	CD 150pf 50V 20%	1523-0151-002	B9
C577	CD 470pf 50V 20%	1523-0471-002	B7
C578	MY .015mf 100V 5%	1508-0153-510	B8
C579	E U 1mf 50V	1513-0010-004	B2
C580	CD 470pf 50V 20%	1501-0471-007	B7
C581	CD 15pf 50V 10%	1500-0150-650	C3
INTEGRATED CIRCUITS			
IC501	LM2902N	3130-3157-637	B8
IC502	CA3130E	3130-3167-914	B6
IC503	74LS73	3130-3157-634	C6
IC504	74LS02	3130-3157-632	A4
IC505	Reg 5V 7 MO5C	3130-0000-019	B3
IC506	Reg 8V 5 0.1A 78L08AC	3130-0000-021	B3
IC507	MC1723 CP	3130-3157-655	B2
IC508	7414	3130-3157-654	C9
IC509	LM358N	3130-3167-909	D8
IC510	MP3870-8215	3130-6060-309	C8
IC511	CMOS Synth II	3130-6088-000	A4
TRANSISTORS			
Q501	SPS 1473 Red Top	4801-0000-035	B3
Q502	SPS 1473 Red Top	4801-0000-035	B4
Q503	SPS 1539 Wht Top	4801-0000-060	A3
Q504	SPS 1539 Wht Top	4801-0000-060	A3
Q505	SPS 1539 Wht Top	4801-0000-060	A2
Q506	SPS-952-2	4801-0000-016	A3
Q507	SPS-952-2	4801-0000-016	A3
Q508	SPS 1473 Red Top	4801-0000-035	C5
Q509	SPS 1473 Red Top	4801-0000-035	C4
Q510	RF Silicon MPS	4801-0000-030	C4
Q511	Darlington D40C1	4814-0000-002	B5
Q512	SPS-952-2	4801-0000-016	D9
Q513	SPS-952-2	4801-00-0-016	D8

LOCATION	DESCRIPTION	PART NUMBER	ZONE
DIODES			
CR501	Germ	4807-1233-900	A4
CR502	Sil Rect 3 Amp 3A100	4806-0000-005	B2
CR503	IN4148 SP	4805-1241-201	A3
CR504			
CR505			
CR506			
CR507			
CR508			
CR509			
CR510			
CR511	IN4148 SP	4805-1241-201	C9
CR512	IN4148 SP	4805-1241-201	C9
COILS			
L501	RF	1800-3152-035	C5
L502	RF Input Org	1800-3152-020	C5
L503	RF	1800-3152-034	C4
L504	RF Input Org	1800-3152-020	C4
L505	Choke LM-2 8.5T	1803-5125-910	C3
L506	Choke LM-2 6.5T	1803-5125-909	C3
MISCELLANEOUS			
RT501	Thermistor	5300-0000-001	B5
P501	Conn 14 cond.	2105-3299-202	D9
Y501	Xtal 10.240 MHz	2338-3300-501	B4
FB501	ferrite bead w/lead	2502-3293-901	C4
FB502	Not used		
FB503	Not used		
FB504	ferrite bead w/lead	2502-3293-901	A2
FB505	ferrite bead w/lead	2502-3293-901	B4
FB506	ferrite bead w/lead	2502-3293-901	B5
J502	Cable assy	6008-3425-701	C9
	Crystal clip	2830-6073-500	
	Heatsink TO-92 (Q510)	5400-1329-000	

OTHER MECHANICAL PARTS

DESCRIPTION	PART NUMBER	QUANTITY
Chassis XLH257	1403-5444-000	1
Retainer, power plug	1400-1325-400	1
Conn Housing (J1)	2109-5120-403	1
Audio Jack (J2)	2101-3262-400	1
Microphone Jack (J3)	2105-0000-023	1
Antenna jack	2105-0000-020	1
Contact recept. for power jack	2107-3244-104	2
Screw 4-40 x 5/16	2803-0312-001	2
Screw 4 x 1/4 Hex WH	2811-3185-600	7
Screw 4 x 1/4 Phillip Hd	2808-0250-012	6
Shield bottom	2506-6067-400	1
Case bottom	1411-7053-008	1
Screw, plastic 6 x 2 3/8	2816-3298-702	4
Speaker 4 in. sq.	1301-3299-603	1
Case top	1411-7052-903	1
Push-on fasteners	2853-3275-901	4